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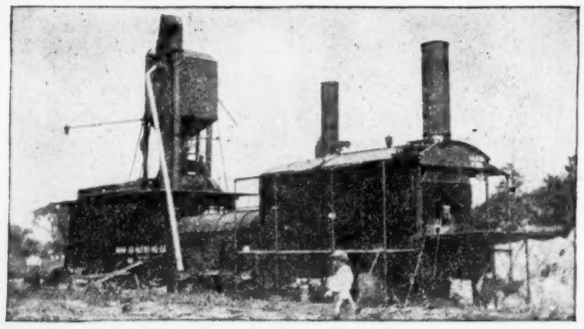

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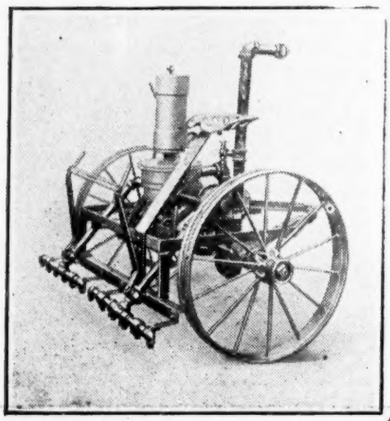

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Contributed Articles and Reports

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal and Public Works regularly their annual and special reports.

Information Bureau

The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

CONTENTS OF THIS ISSUE.

Editorial Notes 275
Progress in Road Paving—Standpipe Painting Data—Prepare Roads for Winter—Preparing for 1920 Road Work

American Society for Municipal Improvements Convention... 276
Narrative of the New Orleans convention, describing the more important doings—business transacted, committee reports presented, papers read and discussed, exhibits of appliances, etc.

Texas Progress Chart (Illustrated) 277
Devised by the state highway engineer for showing the weekly progress of the several highway contracts

Economic Values in Sewage Sludge 278
Discussion of the inherent values, the products obtainable from it, their market values, how they can be separated out, and under what conditions such process would be profitable

Refuse Dumping at Oakland (Illustrated) 280

Wire Ropes in Contract Work 281
Suggestions for the selection and care of such rope, drums and sheaves to be used, making socket and clamp joints, etc.

Road Site Built Up by Grass (Illustrated) 282

Water Filtration in the Tropics 282
The results obtained by a slow sand filtration plant in Hawaii are described by the sanitary engineer of the Territorial Board of Health, S. W. Tay.

Legal News—Notes of Recent Decisions 283

The Municipal Index 284

News of the Societies 286

New Appliances (Illustrated) 287

Industrial News 288

Contract News 15

PROGRESS IN ROAD PAVING.

In connection with the papers, reports and discussions on paving at the New Orleans convention of the American Society for Municipal Improvements, two facts seem to have a certain significance—first, no new ideas were presented for pavement surfacing, except perhaps some minor details, and no changes were adopted to the standard specifications of the society for pavements; second, four of the papers out of the eight read on the subject of paving gave prominence to the idea that under some conditions cement concrete base for pavement was less desirable than macadam or bituminous concrete.

A third idea that was emphasized by most of the speakers was that, in spite of all that has been said and written on the subject, the soil foundations of pavements still receive far less attention than their importance demands, and less is known about them and how to treat them than is known concerning the various wearing surfaces. We expect to discuss this at some length in a week or two.

PREPARE ROADS FOR WINTER.

Some roads wear out, others weather out. And for most roads in northern climates the most destructive weathering occurs in winter and during the subsequent thawing. Much of the injurious effect can be prevented by precautions taken now, such as removing all ruts from the road surface, immediate completion of all drainage work under way, removing weeds and other obstructions from side ditches, drain outlets and culverts, sealing the surface of bituminous pavements where this has become rough or porous, etc.

For the northern half of the United States this preparation against freezing weather should be begun at once, if it is not already under way, and completed as quickly as possible. Once frost has penetrated an inch or two into the ground, little can be done to prevent its destructive effects continuing until the ground has dried out in the spring.

PREPARING FOR 1920 ROAD WORK.

The urgent desirability of letting 1920 road contracts as soon as possible was presented in this column of the October 25th issue. Within the past week two state highway departments have announced that they are taking what steps are possible toward enabling contractors to ship material and prepare forces for 1920 road work.

S. E. Bradt, superintendent of highways, under date of November 15th, announced that he hoped to award contracts for about 1000 miles of roads in addition to the uncompleted contracts of this season; and, to relieve the open-top car situation, will pay for such materials as sand, gravel and stones as delivered, without waiting for them to be incorporated into the work, vouchers being issued to the railroads for freight as well as to the producers for the materials, the amounts to be deducted next year from the contractors' estimates. This is to insure obtaining the materials and avoiding car congestion, as explained in the October 25th issue.

Charles M. Upham, chief engineer of the Delaware State Highway Department, made public, by a circular letter dated November 18th, a tentative list of roads that probably would be improved by the state in 1920. This information was sent to contractors "in order that it may give you an opportunity to look over the roads, locate your materials, and do anything necessary to prepare yourselves for submitting proposals." He expects to advertise the contracts early in 1920.

These states are really doing something which should tell in the degree to which they will be able to carry out their 1920 programs.

STANDPIPE PAINTING DATA.

In our November 1st issue we published a paper discussing the painting of standpipes, in which reference was made to data bearing on the subject which had been collected by the author and had been tabulated by him and would be published in this issue of Municipal Journal and Public Works. Owing to conditions caused by the still continuing strike of the printers there has been delay in setting up this table and it is not ready for this issue, but we hope to be able to publish it in that of November 15th.

AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENT CONVENTION

Narrative of the Doings of the Society at the New Orleans Convention—Reports of Secretary, Treasurer, and Committees—Papers and Discussions—Exhibits—No Changes in Specifications

Owing to the omission of the convention in 1917, the completion of the 25th year since the organization of the A. S. M. I. coincides with the holding of the 25th convention. The society is recovering rapidly from the effects of the war, as is demonstrated by an increase this year of more than 50 per cent in the attendance at the convention over that in 1918 at Buffalo, the latter being the first held after the interim caused by the war. It is further shown by the increase in membership. The Secretary's report showed a loss in membership to October 1, 1919 of one, but the executive committee's report showed a net increase in membership from that date until the opening of the Convention of 26, and there was an additional increase during the Convention of 17 so that the membership now amounts to 585 individuals.

The distance of New Orleans from the center of the membership caused the absence of many of the older members, the proportion being indicated by the fact that there were seven past presidents in attendance as compared with the usual ten to fifteen, most of those present living in the south. There were many new faces and their interest in the proceedings gave good promise of the future welfare of the society.

Notwithstanding the diminished income and the greater proportional expense due to war and post-war conditions, resulting in a deficit in the year's operations, the increased interest in all lines of the society's activities is increasing its income, the effect of which is now becoming evident.

The program was followed as printed, with one or two exceptions and the treatment of the two sessions of each day as though they were one.

TUESDAY'S SESSION.

Following the address of welcome, the response, and the President's address, the Executive Committee, Secretary and Treasurer presented their reports. These showed that there had been admitted during the year 66 active members, 10 affiliated and 20 associate; while there had been lost 66 active, 4 affiliated and 27 associate. The membership on September 30th was 424 active, 22 affiliated and 96 associate—a total of 542.

The membership dues received totaled $1622 from active members, $82.50 from affiliated, and $777.50 from associate. Receipts from sale of Proceedings were $179, from advertisements in Proceedings, $422.52, and from sale of specifications, $64.15. The total receipts for the year were $3286.07 plus $36.10 interest on Liberty bonds owned by the society. The expenditures included $212.50 for printing and stationery, $600 for clerical, $300 salary of secretary; postage and express, $184.37; printing Proceedings, $1662.46; printing specifications, $90; Convention expenses, $675.35. Some miscellaneous expenses brought the total to $3848.74.

The treasurer's report showed the above in detail; also that the cash balance at the beginning of the fiscal year was $728.81, and on October 11, 1919 was $252.24. In addition the society owns $1500 of the third issue of Liberty bonds.

The report of the Finance Committee was submitted on Friday morning.

Three excellent reports were presented on Tuesday afternoon, which were good reviews of progress and present tendencies: One by A. Prescott Folwell on public markets; one by N. S. Sprague on municipal legislation and finance, and one by A. Chaussé on fire prevention.

The smoker given by the local committee on Tuesday evening gave a good opportunity for the members to become acquainted, and, although it was posted as being "a la Sahara Desert," it was a Sahara in but one respect.

The Society regretted that they could not become acquainted with T. L. Willis, the city engineer in charge of convention arrangements, who has been the subject of hospital attention for some months. Also it appropriately expressed its sorrow for the death of Captain W. J. Hardee, elected third vice-president last year.

WEDNESDAY SESSIONS.

The sessions of Wednesday were devoted particularly to sewerage and sanitation, including the New Orleans systems, described by Geo. G. Earl; the functions and duties of state and provincial health authorities and their cooperation, by F. A. Dallyn; sewage treatment and utilization by Raymond Wells, dealing especially with economic values of sludge; Geo. T. Hammond on the Brooklyn sewage treatment experiments; E. S. Dorr on the acid process of sewage treatment; the sewage disposal methods of the Emergency Fleet Corporation, by C. P. Collins (read by Mr. Hammond in Mr. Collins' absence); army camp utility operation, by Maj. W. L. Benham, and street cleaning and snow removal by Geo. H. Norton. There were also interesting papers on Water Supply and Sanitation Systems in St. Nazaire camp, France, by Maj. J. B. Hawley and in Camps Meade and McClellan by Morris Knowles and J. M. Rice.

A very prominent, pleasing and instructive feature of the evening program was the lecture of W. D' A. Ryan. director of the Schenectady Illuminating Engineering Laboratory, on "Illuminations, Ancient and Modern, with special Reference to Decorative Street Lighting," illustrated with many handsomely colored stereopticon slides illustrating the development of the art of illumination and its application to decorative lighting and artistic street illumination. The practical application of the development was made in a specially satisfactory manner. It was introduced by a brief report from C. W. Koiner, Chairman of the street lighting committee.

THURSDAY SESSIONS.

Thursday programs were confined almost exclusively to pavement and road discussions and the latest problems were discussed in papers very much to the point and showing thorough familiarity with them.

Recent developments in concrete highway construction were described by A. N. Johnson. Bituminous pavements had full attention in papers on mineral aggregates for them by W. L. Caldwell, bases for them by Geo. C. Warren, maintenance of them and of macadam pavements, including the use of bituminous materials therein, as practiced in France under war conditions, by Maj. E. A. Kingsley. Brick pavements were covered by papers on economy in brick street and road construction by W. P. Blair, on vertical fiber brick pavements by C. R. Mandigo and on brick and block for street paving by S. C. Corson.

The discussion of pavement foundations was quite full in the papers by Johnson, Warren and Blair and presented some valuable material for consideration in connection with this important problem, which is apparently the next important problem in pavement and road construction to receive special consideration, and has always been the most important and usually the most neglected problem.

Very few changes in standard specifications were offered and none were passed to letter ballot by the members. Quite a number of brief changes in details of construction were offered for the stone block specifications, likewise for the cement concrete specifications, and the new committee on specifications for sidewalks, curbs and gutters presented full specifications. These were all referred back to the respective committees for further consideration and report at the next convention and will be printed in the volume of Proceeding of the 1919 convention.

The subjects of National highways and public works were ably discussed by S. M. Williams, chairman of the Highway Industries Association and Federal Highway Council, and W. B. Gregory, consulting engineer, of Tulane University, New Orleans, and the convention passed a resolution that "whereas several bills have been introduced in the Congress of the United States providing for the construction of a Federal Highway system, the American Society for Municipal Improvements in convention assembled most heartily expresses its endorsement of the construction of such a system of highways."

FRIDAY SESSION.

Friday morning, as well as a part of Wednesday evening, were largely ocupied by a series of papers on city planning and construction, with special emphasis on adornment and convenience and adaptation to the topography.

They were introduced by a brief report by Nelson P. Lewis, chairman of the committee, covering their general principles, and included a paper by Thomas Adams on the planning of land in relation to social problems, one by Nelson Cunliff on architectural design and construction in St. Louis parks, and one by Knowles, Rice and Rose on the Loveland Farms development at Youngstown, O. The arguments in Mr. Adams's paper are practically exemplified by his references to the regional development oposite Detroit, which was described in detail in a paper presented to the Society last year. Methods of designing such developments are given in the paper on Loveland Farms.

The report on uniform traffic laws and classification of highways by Maj. R. K. Compton, and the paper on highway traffic by F. A. Reimer, should be considered especially by those interested in the design of highway systems, as they contain the latest on these important subjects, and take definite steps toward more thorough and intelligent study of matters not yet fully understood.

EXHIBITS.

The number of exhibitors was much greater than usual and the pleasing manner of decoration used with the character of the exhibits gave a very satisfactory effect to the eye and seemed to be more than usually satisfactory to both exhibitors and members. The list of exhibitors included the following:

American City, New York. Asphalt Association, New York. Barber Asphalt Paving Co., Philadelphia. Barrett Co., New York. Birmingham Slag Co., Birmingham, Ala.. Bitoslag Paving Co., New York. Brandeis Machinery & Supply Co., Louisville, Ky. and Memphis, Tenn. Carson Petroleum Co., Chicago. Cement Products Co., Wilmington, N. C. Creosoted Materials Co., New Orleans, Cudlipp Belting & Machinery Co., New Orleans. Dunn Wire-Cut-Lug Brick Co., Conneaut, O. Engineering News-Record, New York. Ferguson Segment Block Co., St. Louis. Granite Paving Block Manufacturers' Association, Boston. Harry Brothers Co. of Louisiana, New Orleans. Ideal Power Lawn Mower Co., Lansing, Mich Jennison-Wright Co., Toledo, O. Kinney Manufacturing Co., Boston. Manufacturers' Record, Baltimore, Md. Municipal Journal & Public Works, New York. National Paving Brick Manufacturers Association, Cleveland. Monroe L. Patzig, Des Moines, Iowa. Pittsburg Testing Laboratory, Birmingham. H. H. Robertson Co., Pittsburg. St. Louis Convention Bureau. Sinclair Motor Co., New Orleans. Southern Construction News, Little Rock. Standard Oil Co. of Indiana, Chicago. Standard Oil Co. of Louisiana, Asphalt Sales Dept., New Orleans. Standard Oil Co. of New York. Texas Co., Asphalt Sales Dept., New York. Isaac Ventrump, Chicago. Warren Bros. Co. Boston. R. D. Wood Co., Philadelphia.

As usual in the election of officers, the first vice president as moved up one step, Geo. H. Norton, city engineer of Buffalo, becoming president.

Maj. R. Keith Compton, chief engineer of Baltimore Paving Commission, first vice-president.

E. S. Rankin, engineer of sewers, Newark, N. J. second vice-president.

W: W. Horner, Chief Engineer of Sewers and Paving, St. Louis, Mo., third vice-president.

Charles Carroll Brown, Prof. Civil Engineering, Valparaiso, Ind. Secretary.

Fred J. Cellarius, consulting engineer, Dayton, O. treasurer.

F. A. Reimer, county engineer, Newark, N. J. (Chairman), L. D. Cutcheon, secretary of Dept. of Public Works, Grand Rapids, Mich., and F. A. Dallyn, Provincial Sanitary Engineer, Toronto, Ont. finance committee.

St. Louis was chosen as the next place of meeting.

The local committee, in spite of the absence of its head, showed itself fully equal to the occasion and members and their ladies were outspoken in their approval of the arrangements as carried out.

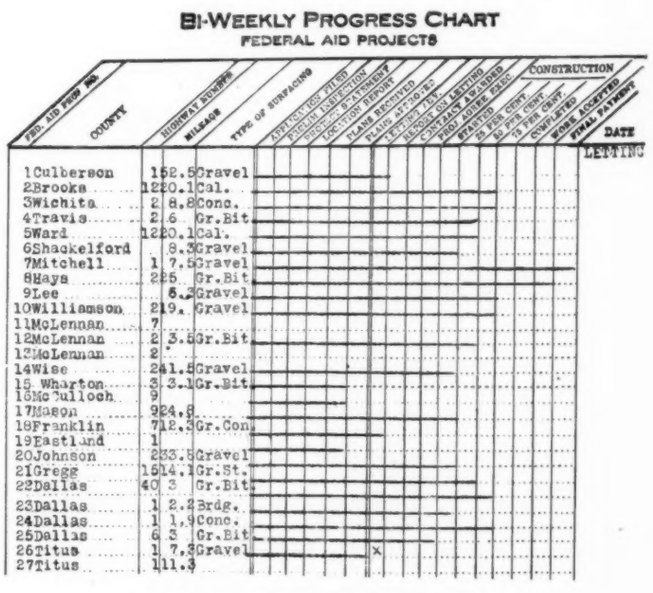
TEXAS PRORESS CHART.

In the March 29th issue we described a method of giving information concerning the progress being made week by week in the construction of state highways in Texas, a code letter having been devised by state highway engineer George A. Duren for this purpose. A key was published for interpreting the letter.

Mr. Duren's successor, Rollen J. Windrow, has substituted for the weekly code letter a bi-weekly progress chart, a reduced copy of part of which is shown herewith. This can be read at a glance without the use of a key. On the other hand, it requires four large sheets instead of two or three inches on a single sheet.

The chart contains records for 117 Federal aid projects and 98 state aid. The first five columns give the project number, county, highway number, mileage, and type of surfacing, these remaining unchanged. As the several steps toward completion are taken, a heavy line is drawn opposite the road across the columns representing these steps. Until the stage has been reached of application for a project number, a road is not placed on the list.

Supplementing the chart is a general summary of all projects; also data regarding new projects added since the previous issue, and an announcement of lettings to be held. The letter of October 25th stated that 9 Federal aid pro-



PART OF TEXAS PROGRESS CHART.

jects had been completed, totaling 110.8 miles, and 22 State aid projects, totaling 223.7 miles. The abbreviation are defined as follows:

Sand and Clay, Snd. Cl.; Caliche, Cal.; Clay and Caliche, C & C.; Mud Shell, Ms. Bit.; Iron Ore, Iron O.; Gravel, Grav.; Gravel and Bituminous, Gr. Bit.; Gravel and Concrete, Gr. Conc.; Gravel and Mcadam, Gr. Mca.; Concrete, Conc.; Concrete Bituminous, Conc. Bit.; Asphalt, Asph.

ECONOMIC VALUES IN SEWAGE SLUDGE.

No Net Returns Probable Unless Ammonia Exceeds Three Per Cent—Decreasing—Market Value of Products.

A comprehensive paper entitled "Economic Value in Sewage and Sewage Sludge "was presented before the American Society for Municipal Improvements on November 12th by Raymond Wells, chemist and technologist of Homer, N. Y. The author presented some ideas and figures as to values different from those commonly found in such articles, and discribed at some length an experiment in treating the sludge as garbage is treated by the Cobwell process. The paper, somewhat condensed, is given below.

Partial elimination of moisture by filterpressing or centrifuging, followed by drying, would seem to be the simplest method of putting sludge into a valuable form. But unfortunately the almost colloidal character of the precipitate and the amount of grease and metallic soaps contained, render pressing and centrifuging below 75-80% of moisture a difficult task. The subsequent evaporation of so great an amount of water in any type of dryer is most expensive and odors given off are extremely disagreeable. Furthermore, in direct-heat dryers, the volume of gases of combustion together with the moisture-saturated air is so great as to preclude any thought of condensing or scrubbing out the odors. For this reason alone, aside from the difficulties encountered in drying such a material, it is difficult to see any hope of solution in this direction.

Furthermore, the dried residue or tankage obtained by this method, while having considerable manurial value, is in a most undesirable condition for use as fertilizer or fertilizer-base goods. This is due to the grease contained which, when it exceeds 80% in any tankage, renders its assimilation by the soil extremely difficult. To really complete the cycle of operation, the dried sludge should be percolated, grease removed and the percolated tankage redried. Since, however, a large percentage of the grease present is in combination with alkaline earth and heavy metals in form of metallic soaps, solution by simple percolation is impossible, but the sludge must first be acidulated with some mineral acid. (Sulphuric acid is the only one that is low priced enough for this purpose.) This will render the fatty acids soluble; but at high temperature any trace of mineral acid would render the fatty materials valueless. Also the acidulation would be expensive and troublesome. For these reasons, the operation of drying, percolating, redrying, etc., so readily applied to other materials, seems not to be very successful when used n sewage sludge.

Destructive distillation of the dried or semi-dried sludge has been attempted, with the usual methods of recovery of the ammoniacal liquors and oils. Here again the problem of moisture elimination is intruded and the recoveries made are not such as warrant the hope of even paying for the operation, much less of showing any profitable return. In both the cases of distillation of dried sludge and of garbage tankage, the experiments of the writer have in all cases failed to show a greater recovery of nitrogen in the ammoniacal liquor than 35-40% of that present in the original samples. As a rule an additional 30% remains in the retort charcoal, with the residue passing off as nitrogen in the combustible gases. The oils passing over are of little value except as fuel. This appeals to the writer as a very expensive way of producing fuel oil.

Acidulation of semi-dried sludge from filter-presses or centrifuges, followed by drying in retorts, with subsequent distillation in current of superheated steam, to carry over the fatty acids liberated by acid, has ben tried, but found unsatisfactory for many reasons.

Methods have been described and tested out on a large scale, attempting the direct extraction of greases from wet sludge by volatile solvents. In these processes, which are difficult and expensive to carry out, a partial solution of the free grease results, together with a portion of the waxes existent in sewage, and of soaps. The result is the formation of extremely resistant emulsions, which seems to defy any recovery treatment by distillation. After such an emulsified mass has reached a certain concentration in the solvent recovery stills, the whole charge expands into a foamy mass in which seemingly a gallon will fill a large tank.

An endless number of methods and schemes have been tried first and last, but apparently none had sufficient merit to survive the first attempts. Possibly many failed under market conditions which do not exist at the present time, or what is more likely, at their beginning they promised so much that mere partial success gave nothing but discouragement.

INHERENT VALUES OF SLUDGE

The value of sludge will be governed by its grease and nitrogen content, since, while all sludges contain small percentages of bone phosphate and potash, from a practical standpoint they may be neglected.

Consider the following analyses (dry basis):

	Ammonia	Grease
Baltimore sludge, acid process, fresh	3.26%	27.23%
Boston sludge, acid process, fresh	3:91%	29.30%
Chicago Sanitary Dist. activated, fresh	5.10%	14.70%
Pleasantville, N. Y. settling basins, one month in basin	4.14%	27.40%
Syracuse, settling basin, fresh	4.02%	9.60%
Syracuse, activated, fresh	5.06%	17.70%

All of the analyses are from samples of sludge produced from comparatively fresh sewage and are representative of sludge rapidly deposited, and not allowed to rest in the tanks for any great length of time. For that reason little bacterial action had taken place and the ammonia and grease content are at their maximum for the different types of sludge.

Compare with these, analyses of samples of sludge from so-called septic tanks or sludge which has been exposed for a great length of time on drying beds:

	Ammonia	Grease
Baltimore sludge from tanks, on bed approximately six months	2.24%	1.50%
Chicago activated, nine months old	4.40%	5.00%
Akron, O., three months in tank, six months on bed	1.00%	6.00%

All other things being equal, the value of a sludge for by-product recovery purposes depends upon the shortest possible period of tanking and shortest elapsed time between tank and ultimate utilization. In other words, bacterial action and weather erosion must be restricted to a minimum. This is directly contrary to usual sewage practice and is one of the rocks on which the disposal proposition has stumbled.

Below a certain minimum of recoverable values, there is no use attempting recovery. This minimum seems to be, for low-grade ammoniates such as garbage tankage and sewage sludge, approximately 3% ammonia. Below this, the expense of handling and freight cost put it out of all hope of competition with other and more concentrated materials. From an economic and business standpoint, any goods falling below this rating had better be forgotten and no time wasted on developing methods of handling.

Moisture content of sludge leaving tanks is the next most vital consideration. In order to come within economic range of any method of artificial drying of any material containing 3 to 3.5%ammonia and 10 to 15% grease on dry basis, moisture must not exceed 75 to 80%. All sludges as they come from tanks or basins are far above this and activated sludge way beyond. Sludge from ordinary sedimentation basins can be drained and air-dried within several weeks to 77 to 80% moisture and by centrifuging to about the same amount. It would appear, however, that the simp-

lest and most inexpensive method is that of depositing sludge, after removal from tanks, on drainage beds exposed to atmospheric drying conditions. In any case, without the presence of water-dumping facilities, the sledge must be partially dewatered before final disposition.

With sludge containing 75% moisture, the ultimate disposition with by-product recovery is not impossible, tho difficult and presenting many curious conditions.

THE COBWELL PROCESS

To accomplish the disposal with production of a marketable tankage and grease, the elimination of all of the moisture with subsequent extraction of the grease by volatile solvents by a system of drying, extraction and recovery in one operation is suggested. Such a combined and complete operation is carried out at the present time only by the Cobwell process.

This process, as is doubtless well known, is applied to handling of municipal garbage, dead animals, slaughter-house offal and other wet organic waste materials. At the request of several engineers and municipal officials a number of small-scale and several large-scale experiments have been undertaken and carried out on sewage sludge, with results which seem to warrant some hope of solution of the problem.

It is unnecessary to go into any detail in description of a process with which most engineers are familiar. But some variations are required in applying it to handling of sewage sludge.

In this method of dehydration with simultaneous degreasing, the principle employed is that of dessication in a hot bath of an immiscible solvent, which shall serve not only as a dehydrating medium but shall also during the period of drying continually dissolve the grease contained in the material to be dried. Such a solvent preferably employed in the handling of sewage sludge, is a high-boiling petroleum naphtha, distilling within the range 360-F.-420F., which corresponds to the first 60-70% over in the fractionation of "Standard Waterwhite Kerosene." This material serves not only as the most economical heating medium but, owing to the high temperature maintained in the dessicating mass, serves to remove or dissolve the metallic soaps as well as the free grease. Cold or merely warm solvents of a less oily nature have little solvent action on such soaps, but high-boiling oils, particularly when carrying small quantities of grease, are able to dissolve them without difficulty. Upon cooling they are apt to be deposited as jelly-like masses or to cause the gelatinization of the whole solvent solution, and for that reason the solution must be treated before entering recovery stills, in such a manner that the soaps are decomposed and a solution of clean, fatty acids results. This treatment will be taken up in order.

[The author here described the apparatus, which description is omitted.]

The entire cycle of operations takes place in a closed circuit and the only vent for non-condesible gases for the whole system of tanks (or reducers), condensers, separating tanks, washers, stills and storage tanks, is on the final solvent storage tank or tanks. This vent in turn exhausts thru an oil scrubber to recover traces of naphtha carried over by carburetting. During no period of the operation is the sludge exposed to the air or manhandled in any way, until it is finally discharged from the side door of the tank in a dried, degreased condition. The only places where odors or noxious effluent are exposed to the air and liable to cause an insanitary and nuisance condition, are at the gas vents on the storage tanks and at the effluent overflow on the separating tank. This effluent is of course water distilled from the sludge and carries with it the odor of the sludge, which in the case of fresh sludge and that preferably handled, is very offensive. The quantity of this water is of course equal to that contained in the sludge prior to dessication and the condensed steam from the steaming out of the solvent from the drained sludge, prior to dumping from machine. This approximates a ton of effluent for every ton of sludge handled. The only way found by the writer to effect deodorization of this effluent and of rendering it harmless, is by the addition of chlorinated lime or chlorine water. The greatest amount necessary for deodorizing very foul water is one part of 35% available chlorine bleaching powder to 3000 parts effluent. The non-condensible gases leaving the storage-tank vents must be scrubbed with chlorinated lime solution before allowed to pass to atmosphere.

With these precautions, it is safe to say that the entire operation of dessication and degreasing, or the whole recovery operation, can be carried out with no offense to public welfare and sanitation.

In handling sewage sludge by this method, no difficulties have arisen, other than those usually met with in handling wet organic materials of other sorts, and since in sludge the moisture is present in free condition, mechanically combined, the period required for dessication is much shorter than that met with in the treatment of garbage and animal refuse, in which the majority of the water is more or less chemically combined. For this reason only four or five hours are required in drying a given amount of sludge compared with at least twice that for the same amount of garbage.

Experiments and trial runs indicate the capacity of each tank as eight tons in twenty-four hours and in a plant handling the sludge from a town of 200,000 inhabitants (approximately 40 tons 75% moisture basis daily), the cost for handling, including overhead and fixed charges, will approach $6 to $6.50 per ton of green sludge. This cost will not be greatly changed in handling sludge containing 75% or 50% moisture, but since the gross tonnage to be handled would be greatly reduced, the plant investment would be greatly reduced and the by-product returns per green ton much greater. If by any method of dewatering on beds or other inexpensive method, the moisture can be reduced below 75%, by just so much will the success of a recovery plant pass from just self-maintenance to a possible profit.

After carrying out such an operation, what possible yield of by-products may be expected and what is their character and what their value? This depends entirely on the nature of the sewage handled. It has been presupposed that any sludge running less than 3% of ammonia on a dry tankage basis is not worth handling, unless indeed the grease content is very high, in which case it is possible that the grease alone might pay for recovery. From an average of a number of analyses, however, it would seem as if a sludge low in ammonia is also low in grease, so that a 3% ammonia tankage would indicate a 15-25% grease content on a dry basis. For these reasons, in handling a 75% moisture sludge, a yield of 430 pounds of tankage and 75 pounds of grease may be expected.

MARKET VALUE OF PRODUCTS.

What is the nature of this grease and tankage; have they any market value? This is not a matter to be dismissed off-hand. At the present time, if either or both of these products were thrown on the market, emphatically they would not find a purchaser, or certainly the price would be absurdly low. Consider the nature of these by-products as indicated by their analyses:

Analyses of Greases From Different Types of Sludge

	Free Fatty Acid	Unsap.	Neutral	Moisture
Baltimore (acidulated)	77.48%	11.78%	.....	10.74%
Chicago (activated)	48.80%	24.40%	19.1%	7.70%
Syracuse (sedimentation)	51.50%	19.30%	18.70%	10.50%
Pleasantville, N. Y. (sed.) ...	75.70%	19.80%	4.50%	.....
Boston Moon Island (sedimentation)				
Free fatty acid (as oleic) ...	48.40%			
Free fatty acid (by weight) ..	40.19%			
Rosin acids (in fatty acid)* ..	14.36%			
Fatty acids (by difference) ..	25.83%			
Unsaponifiable	21.09%			
Neutral grease (by weight) ...	20.00%	(molecular weight of neutral fatty acids 272)		
Metallic soaps and solid imps.	3.30%			

The first four analyses are of grease recovered in the process outlined and it will be noticed that in the first three, large quantities of solid impurities and moisture are recorded. All grease of sewage-sludge origin on leaving stills contains large amounts of such impurities, since, due to the emulsifying action of the waxes present in the so-called unsaponifiable, it is very difficult to obtain clean greases without subsequent washing with acid and settling. The fourth analysis is of a grease after such treatment.

These analyses are of several different types of sludge and sewage treatment, yet all present the following general characteristics:

The saponifiable matter in each case consists for the most part of free fatty acids and a very small portion of neutral grease or combined glycerides. This is, of course, anticipated by the fact that the greater part of the grease present in sewage sludge comes from hydrolysed soap solutions, or thru the action of bacteria and ferments neutral grease has been broken down into fatty acids and glycerine. In any event, the neutral grease present gives no hope of glycerine recovery, so at once the so-called grease falls into the grade of poor-class fatty-acid stock. Of the total fatty acids present, varying in a number of analyses, from 1 to 15% of the total consists of rosin acids. These again are from the soap solutions.

The unsaponifiable matter varies between 10% and 30%, but a majority of samples analyzed show an average of 20%. As may be supposed, the lowest percentages are found in strictly domestic sewages, where they are traceable to body waxes and products of physiological action. In mixed sewage from manufacturing towns the unsaponifiable is highest, as it is made up of mineral oils thrown out from different factories, mills, etc.

Small percentages of metallic soaps of calcium, iron, aluminum and magnesium are present, but upon proper treatment are broken down into fatty acids and mineral salts, washed out as sulphates or chlorides, dependent on the sort of acid used for refining.

From these premises it is necessary to conclude that sewage grease can be regarded only as a very low-grade fatty-acid stock containing 70-75% of fatty acids and 25-30% of unsaponifiable. These fatty acids, depending on the sewage from which they are extracted, will vary in color from a dark ruby red to a black tarry looking mass. In consistency the variation is between a soft buttery mass and a hard and solid cake. This is quite readily explained, the former is very high in fluid-mineral and industrial-refuse oils, the latter from domestic sewage in which the high-melting-point fatty acids have been hydrolysed and precipitated from the soap liquors, whereas the oleic-acid soaps or oleic acid present in mixed soaps remain in solution and pass off with the effluent.

Fatty acids of this type have no legitimate market at this time. Such materials are only valuable as they are refined and made into marketable products. A purchaser of sewage grease would expect by his own efforts to give it all of the value it might ultimately have and, having created something out of nothing, would care to pay little for the raw material. That sewage grease in refined or manufactured form has value is not to be questioned. Such a grease as that indicated in analyses as Pleasantville sludge grease, upon distillation in the manner usually employed for fatty acids, gave the following yields:

Light colored distillate	85%
Still returns	6%
Stearine pitch	6%
Loss	3%

The distillate was orange yellow in color and of high titre and upon pressing gave 50% of good-colored stearic acid of titre 53.3C. and 50% of red oil containing 38.25% unsaponifiable. Upon pressing, all unsaponifiable matter passes out of seeded or crystalline cake in the red oil, leaving good stearic acid behind. This red oil is marketable for grease compounding and as wool oil. In other words, sewage grease must be manufactured to have value. Once its value is established, a market will be automatically created for the raw grease.

Upon whom shall the burden of carrying out these operations fall? Shall each sewage plant carry out the whole work from sewage to finished product? Shall a number of sewage plants pool their sludge, or their raw grease and tankage and finish at a central plant, or shall a number of plants interest directly a corporation or individual able to carry out the refining operation? At this point sewage sludge ceases to be a problem for the scientist and becomes a purely business proposition.

Returning to the question of disposition of the tankage, it would require considerable propaganda to place upon the fertilizer-goods market a low-grade 3% ammoniate, cursed with the name sewage sludge, tho in the old days of poudrette and natural guano it had an enhanced value in the public mind far greater than its chemical value indicated. The great diluent of sewage tankage is insoluble ash or mineral matter, running from 40-70%with 60% as an average. It is not impossible to concentrate this, tho methods are not yet complete for doing so. A number of experiments conducted by the University of California indicate that, for percentage of nitrogen contained, degreased sludge has higher plant food value than that in dried blood or high-grade tankage.

Even with reasonable markets for the tankage and grease, it is a question whether it is possible to recover enough materials to defray the cost of the operation. In the opinion of the writer and from experience in the garbage reduction business, it does not seem impossible, tho there would be little margin of profit left. But the sludge would be disposed of, its disposition paid for and a large amount of needed materials returned to active use to assist in helping out the world's supply of chemicals and greases. The individual city would receive no monetary return probably, but to virtually create actual concrete products of economic value, to pay for the creation and at the same time solve a troublesome disposition problem is something well worthy of consideration.

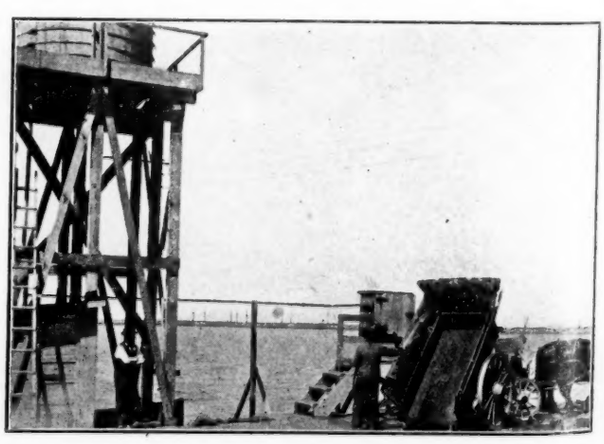
With ordinary sedimentation of suspended solids, it is not at all unreasonable to expect from the sewage of a town of 150,000 people daily recoveries of five tons of tankage and one ton of grease. There are many towns of this size. Any city of this class which can return to a useful cycle $50,000 worth of needed materials annually, should consider well the disposition of its sludge pile.

Solving the problem of sludge disposition is not impossible, it is difficult. No chemist, engineer, business man or politician can solve it alone. That co-operation which has not existed must first be accomplished, before any hope of solution is arrived at.

REFUSE DUMPING AT OAKLAND.

As described in our issue of April 26th, Oakland, Cal., disposes of its refuse by dumping it along the water front to a height of eight or ten feet above high water and covering it with sand. The sand is supplied by an electrically operated dredge which pumps the sand from the bay and delivers it onto the dump. One of the illustrations shows the top of the dump, partly covered with sand.

About sixty loads of refuse a day are brought to this dump, and the drivers of the wagons are required to thoroughly wash them with sea water each trip, immediately after dumping the load. For this purpose a wooden tank at an elevation of about 20 feet is kept filled with sea water



WASHING REFUSE WAGON WITH SEA WATER.

OAKLAND REFUSE DUMP.

by an electrically operated pump. A hose receives water from the tank and is used for washing the wagons thoroughly in every part. It is believed that sea water is more effective than fresh in preventing the wagons from attracting flies.

WIRE ROPES IN CONTRACT WORK.

Suggestions for Prolonging Their Life and Avoiding Accidents—Making Socket and Clamp Joints.

The selection and method of using wire rope employed on derricks and for other purposes by contractors has a great deal to do with determining the life of the rope and the avoidance of accidents due to its failure. A recently published bulletin of the Bureau of Mines gives some excellent suggestions on these points, many of which, although intended especially for mine work, are equally pertinent for contract work.

New rope, when used in lengths of 500 feet or less, should have a factor of safety of at least eight, such factor being applied to the breaking strength of the rope as guaranteed by the manufacturers. When this factor becomes less than 6.4, the rope should be discarded where lives depend on it, although in other cases the factor may be allowed to reach 4.

Soft steel rope is more flexible and is less affected by corrosion from acid water, while those made of hard-drawn steel or plough steel weigh less for a given strength and resist abrasion better. The former is therefore preferable where it is to be wound on small drums or passed through small sheaves, while the later is better where not so wound and for use in hauling where the rope drags along the ground. Flexibility is also secured by making the rope of a large number of small wires instead of a smaller number of larger wires; but the latter is preferable where the rope is subjected to severe external wear. For drag ropes or others constantly drawn over the ground, a rope composed of six strands of seven wires each, laid around a hemp core to give flexibility, is generally used. External wear is also reduced by using "lang-lay" rope, if such rope can be so used as to prevent it from untwisting. In this make of rope a considerable length of each wire comes in contact with the sheaves, with the ground or with wires of another strand, and thus wear on the outside of the rope is distributed and nicking of the inside wires is greatly reduced.

The length of rope should be sufficient to permit cutting off the end and re-socketing six times or more and to allow at least two laps of the rope around the drum when drawn out to its fullest extent.

The drum on which the rope is wound should be large for wire rope, the greater the diameter the better. The diameter of sheaves should be from 66 to 100 times the diameter of the rope. The hoisting drum should be so set that the angle made by the rope with the axis of the drum will at no time depart more than 1½ degrees from a right angle; otherwise the rope is apt to climb upon that already on the drum or crush against it, or rub against the side of the grooves of a grooved drum. Usually it is advisable to make the drum long enough to carry all the rope in one layer in order to lessen the wear and crushing of the rope.

Wire rope should be stored in a dry place, but not subjected to sufficient heat to destroy the hemp core. If stored outdoors, it should be raised off the ground and well protected from weather. In uncoiling rope from a reel, the reel should be mounted on a horizontal support so that it can revolve; the rope must never be pulled over the flage of the reel when laid on its side. After mounting in place but before actual service, a slight pull should be put on the rope and it should be allowed to twist until it attains its natural position.

The rope may be attached to a load by means of a socket, or it may be bent back on itself to form an eye, the loose end being clamped to the rope with clips or clamps. Properly done, the former method develops the full strength of the rope, but poor workmanship is concealed and shows only when the rope slips or breaks in the socket. The fastening cannot be readily inspected, the rope is rigidly held in the socket and the effect of bending is concentrated just above the socket, and the attachment is much more difficult to make. On the other hand, the other method develops at most only about 85 per cent. of the strength of the rope and usually not more than 80, it bruises and crushes the rope where the clips are applied, and the fastening is more likely to slip; but the attachment can be inspected readily at all times and requires little skill in making.

The method of making the socket joint is described as follows: "The rope should be securely seized or bound at the end with soft iron wire before the end of the rope is cut square. An additional seizing should be placed on the rope a distance equal to the length of the socket from the end. After the rope is trimmed off, the seizing on the end of the rope should be taken off, the rope opened down to the second seizing, the hemp center cut out and the wires broomed out. That is, they should all be untwisted but not straightened. Then the wires should be thoroughly cleaned in benzine, naphtha, or gasoline, as far as they are to be inserted in the socket, and then dipped in commercial muriatic acid for 30 to 60 seconds until the acid has cleaned each wire. Next, the rope end should be dipped in boiling water, to which a small amount of soda has been added to clean off and neutralize the acid. Then the rope end is inserted in the socket and warmed, if the temperature is below 65° F., to prevent cooling the zinc too rapidly. The socket is placed with its axis vertical and coinciding with the axis of the rope, the bottom is sealed with clay or putty, and molten zinc or spelter, heated to a temperature that will just char wood, is poured into the socket until it is full. The socket should preferably be forged from one piece of soft iron, without welds.

The clamped attachment is made as follows: The rope is bent back over a thimble of the proper size and the loose end clamped against the long end of the rope with the proper number of clips. The Crosby type of U-bolt-and-drop-forging clip has proved most satisfactory. The clips should be spaced a distance equal to six times the diameter of the rope apart, the drop forging being against the long end and the U-bolt against the loose end of the rope. The number of clips required to develop approximately 80 per cent. efficiency of the rope and the proper length of wrench to tighten the bolts are given in the table.

Number of Crosby-type Rope clips required to Develop 80 per cent of Strength of 6-19 Plow-steel rope.

Diameter of rope. Inches.	Number of clips	Length of wrench to tighten bolts. Inches.	Efficiency. Per cent.
¾	5	18	77.39
⅞	5	18	79.13
1	5	24	77.89
1⅛	5	24	80.00
1¼	6	24	82.15

The clips must be carefully inspected each day and tightened if they show any signs of loosening through the stretching of the rope."

The fastening should be cut off and renewed if even a single broken wire is found at that point. Even if no

broken wires are found, the rope should be cut off and the fastening renewed periodically, as this is the weakest part of the rope and that most liable to suffer from bending and vibrating stresses. Where a socket joint is used, it is recommended that the time between re-socketing should vary from one month where the average length of actual service is six months, to four months where the average length of service is from 24 to 36 months.

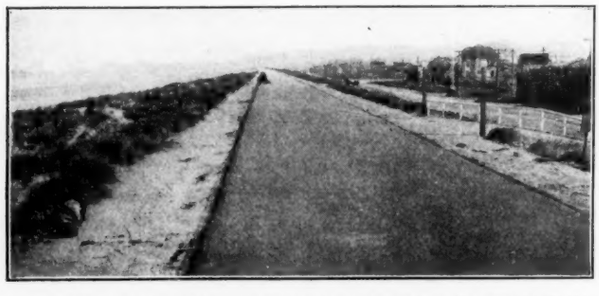
At intervals, say before beginning each season's work, a rope should be examined as to its condition. Besides a careful examination of the outside, a piece should be cut off of each end and unlaid and the inside wires examined for corrosion and wear. If they are found broken or badly worn another piece should be cut off and examined, and if a considerable length is found in bad condition the rope should probably be discarded altogether, or used only for purposes where the breaking would not endanger life or result in serious damage to the work.

A hoisting rope should be thoroughly lubricated, using oils or greases that will penetrate between the wires and the strands and will not harden on the outside. Lubricant that hardens will be cracked when the rope bends over sheaves or drum and will permit moisture to penetrate to the center and cause internal corrosion. Tar should not be used for this purpose, for it forms a hard shield on the outside of the rope and does not penetrate and lubricate the interior. If possible, the rope should be lubricated when dry so as to give the lubricant a better opportunity to penetrate the core and adhere to the wires. The lubricant should be applied often enough to keep the wires well covered and the hemp core from drying out. Before lubricating, all accumulated dirt and gummed lubricant should be cleaned from the valleys between the strands of the rope. This cleaning can be done with a wire brush or with a special device that permits a number of jets of compressed air to play on the rope. The lubricant may be poured on or applied with a brush, but the most thorough and economical method is to use a special device by which the lubricant is applied to all sides of the rope and the excess wiped off. This device consists of a box or trough (the former for vertical and the latter for horizontal ropes) that can be clamped around the rope and allow the rope to be drawn through it, a wiper on the upper end of the box wiping off the excess and the box being kept filled with the lubricant.

Ropes should be inspected every day by the foreman or other competent man, noting the wear of the wires, the stretching of the rope, any broken wires, etc. Special attention should be paid to the rope just above the socket at the clamps, where the rope rests on a sheave, and where it leaves the drum at each end of the hoist.

ROAD SITE BUILT UP BY GRASS.

San Francisco began on May 13 of this year the paving of a road known as the "Great Highway." This is a boulevard along the Pacific Ocean from the Cliff House to Sloat Boulevard and is one of the city's most picturesque and most traveled highways. The stretch paved is 2.8 miles long and contains about 56,000 square yards. It was completed in a little less than 70 working days. The cost, $85,000, was paid out of the good roads fund, which is derived from state automobile licenses.



UPPER ROADWAY, AND GRASS WHICH CAUSED THE BUILDING UP.
Lower roadway is seen at right.

At the northern end, the construction is of concrete base with an asphalt surface, costing $1.71 a square yard. The remainder of the road consists of two inches of asphaltic concrete on top of the old roadway, which was first scarified,, the holes filled in, and rolled. The cost of this, including the scarifying, was 71.1 cents per square yard.

This road is paralleled by another road, which is used for business and local traffic, while the one above referred to is a motor promenade and sits higher than the other. A few years ago both roads were at the same level; but John McClaren, superintendent of Golden Gate Park, planted along the shore a variety of beach grass which tends to build up the ground by catching and holding shifting sand, and this effected the raising of the ground level ten or twelve feet. It is on this higher ground that the roadway just completed was located. The illustration shows the new and the lower roadway; also the grass that caused the raising of the road site, which grass grows upward as the ground level rises.

WATER FILTRATION IN THE TROPICS.

By S. W. TAY.
Sanitary Engineer, Territorial Board of Health, Hawaii.

There is very little information on record of the performances of filtration plants in the tropics. The following is a compilation of the records of a slow-sand filtration plant belonging to the Hawaiian Commercial and Sugar Co., located on the island of Maui, one of the Hawaiian Islands.

The above mentioned plantation in 1915 constructed a filtration plant consisting of settling basin, four filter beds and necessary regulating devices to supply a population of some 6000 persons. The filter beds are 60 by 62 feet. The thickness of sand layer is 3 feet, with one foot of graded rock and gravel beneath. The depth of water on the filters is four feet.

The mechanical analysis of the sand used on the filters is as follows:

Effective size, 10 % less than		0.30
60 % less than		0.56
Uniformity Coefficient		1.87
The chemical analysis is as follows:		%
Iron	$Fe_2 O_3$	0.65
Alumina	$Al_2 O_3$	
Lime	Ca O	57.16
Silica	$Si O_2$	0.39
Magnesia	Mg O	5.20

The sand used was the best that could be obtained on the island and was adopted after testing it out for three months in a small experimental filter ten feet in diameter. The rate of filtration is 3,000,000 gallons daily per acre.

The following is a summary of the monthly efficiency of the plant for the year ending June 3th 1919:

Month 1918	Bacterial Count Raw	Filt.	Eff. %	Turbidy Raw	Filt.	Eff. %	Color Raw	Filt.	Eff. %
July	374	13	97	58	14	76	126	82	35
Aug.	860	55	94	60	11	82	95	55	42
Sept.	1051	20	98	31	7	77	64	33	48
Oct.	1624	60	96	33	8	76	69	35	49
Nov.	1620	59	96	43	11	74	80	45	44
Dec.	2360	85	96	128	24	81	194	114	41
Jan.	888	24	97	41	11	73	81	43	47
Feb.March	886	24	97	55	13	76	120	63	47
April	713	26	96	33	8	76	74	—	—
May	1070	32	97	29	9	69	62	37	40
June	1033	25	98	26	7	73	53	26	51
Mean	1134.5	38.4	96.6	48.8	11.2	77.0	92.3	53.2	42.4

The bacterial efficiency for the year was 96.6 %
Reduction in Turbidity was 77.0 %.
The color reduction was 42.4 %

The raw water, which is highly colored and has great turbidity, is the only available supply and comes from the plantation's main irrigation ditch. This ditch is thirty miles long and receives the wash from a large area of cultivated land. The high color is due to the growth of rank vegetation at the point of collection. The use of chemicals has not been attempted in reducing color and turbidity.

Since the filters have been in operation, typhoid fever has been practically done away with on the plantation Formerly there were one or more cases every month.

LEGAL NEWS

A Summary and Notes of Recent Decision—Rulings of Interest to Municipalities

City Need Not Provide for Bicycles in Streets.

(Utah) A municipality is not bound in the care and construction of its streets to make special provision for bicycles.—Emelle v. Salt Lake City, 181 P. 266.

Liability of City for Injury on Icy Walk.

(Conn.) Where a city failed for several days to clear a much-used walk in the business district of snow, although some of the tenants of property abutting removed part of the snow, the city was negligent and is liable for injuries suffered by a traveler who slipped on the ice formed by melting snow.—Lucy v. City of Norwich, 106 A. 762.

Pedestrian Must Attend to Lawful Incumbrances on Sidewalk.

(N. Y. Sup.) A pedestrian is not entitled to an absolutely level and unobstructed passway, and must exercise his right of passage along the sidewalk with regard to lawful incumbrances or inequalities, and where, through inattention, he suffers injury, there can be no recovery.—Daly v. Rector, Church Wardens and Vestrymen of Trinity Church in City of New York, 176 N. Y. S. 734.

Maintenance of Waste Box Governmental Function—Liability for Injury.

(Ga.App.) The maintenance of a waste-paper box and the removal of its contents is an act by a municipality in the performance of its governmental functions.—City of Savannah v. Jones, 99 S. E. 469.

Where city's employé, after removing contents of waste-paper box, left top or cover open and extending over sidewalk, so that, as plaintiff was walking on sidewalk, the projecting cover, which he did not see, caused an injury, the city would be liable in damages as for breach of its ministerial duty to keep sidewalks clear from obstruction, though in maintaining box it was exercising a governmental function.—Id.

Smooth Tile Sidewalk for Advertising Purposes—City Liable for Injuries.

(Ky) A municipality is not responsible for injury to one falling upon a pavement, unless the pavement was inherently dangerous, or was constructed and maintained according to a plan which was not reasonably safe, and which a reasonably prudent person would not have adopted or maintained.—Schmidt v. City of Newport, 212 S. W. 113.

While a city is not an insurer of the safety of persons traveling upon its streets, it has the duty of exercising ordinary care to keep and maintain its streets and pavements in a reasonably safe condition for use by the public, once it has undertaken to do so.—Id.

The mere fact that a payment is constructed of smooth tile is not sufficient in itself to render it so dangerous and unsafe as to fix liability upon municipality for injuries to persons falling thereon, or even to raise a presumption that such walk is inherently dangerous, but it is in a glazed, highly polished condition, rendering it slick and slippery, which makes it so inherently dangerous as to render the city liable.—Id.

The liability of the city for injuries from defective street does not arise until the city, through its authorized officers, has received or has had reasonable opportunity to obtain knowledge of such defective condition; but the municipality will be charged with notice of such defects as it could by the exercise of reasonable care have discovered, and where it authorized the use of a sidewalk by property owner for advertising purposes, and injury resulted directly or proximately therefrom, the city is lialbe.—Id.

Local Motor Vehicle Regulations Valid.

(Ala.) Where there is an express legislative grant to a municipality of power to ordain to a particular effect, or to do a particular thing, the municipal ordinance expressive of that power cannot be inquired into with respect to its policy or reasonableness.—City of Montgomery v. Orpheum Taxi Co., 82 So. 117.

Since under Const. 1901, § 220, the use of the streets, etc., of cities, towns, and villages for the carrying on of any business for the conduct of any public utility of private enterprises is made dependent upon consent of the local municipal authorities, such authorities may prescribe the conditions under which the use of the streets, etc., may be enjoyed.—Id.

Penal ordinance of Montgomery prescribing regulations for driving, parking, and stopping of motor vehicles operated for hire, and requiring chauffeurs to procure license from city and furnish a bond, held valid, though in conflict with Gen. Act 1911, pp. 634-650, § 32, in view of Const. 1901, § 220, and Code 1907, §§ 1340, 1452.—Id.

Private Construction of Sewer—Delegation of Power.

(Minn.) An ordinance authorizing named persons to construct and maintain a sewer and permitting any person desiring to connect therewith to do so on payment to grantees of his proportionate part of the cost with interest was not void as delegating non-delegable powers to the grantees.—Lee v. Scriver, 172 N. W. 802.

Compliance of Street Improvement with Contract—Assignments by Contractor.

(Ind.) Assignment by contractor of assessments to be made on completion of street improvement, and its acceptance by the city conferred on assignee an equitable interest therein, which was subject to any defenses which might exist against contractor, and gave him no right thereunder which contractor could not have successfully asserted in absence of assignment.—State v. City of Indianapolis, 123 N. E. 405.

Under Burns' Ann. St. 1914, § 8711, contractor of street improvements has no right to have work finally accepted by board of public works of a city until it is completed in accordance with the terms of the contract.—Id.

Board of public works, having made an order approving report of city engineer that street improvements have been made according to contract and accepting the work, can rescind order upon discovery that work has not been properly constructed, and has duty of so doing, unless rights of innocent parties have intervened, so as to make such a course inequitable.—Id.

Board of public works' decision as to whether street improvements have been made in substantial accordance with the contract is quasi judicial in its nature, and when made is conclusive, in absence of fraud, on all persons affected thereby, being immune from collateral attack, and subject to be set aside by the court only in a direct proceeding for that purpose based on fraud.—Id.

Whether street improvement substantially complies with contract is to be determined by board of public works from the real character and condition of the improvement tendered for acceptance, unaffected by any considerations of waiver arising from conduct of the engineers or inspectors who superintend the work; such engineers having no authority to waive defects or radical departures from the contract.—Id.

Where contractor assigned assessments before board of public works had taken any action toward accepting or rejecting the work, the board, in rescinding order of acceptance thereafter made, did not prejudice assignee's rights; assignee being in no more advantageous postion than contractor would have occupied.—Id.

Contractor's assignee cannot complain of refusal of board of public works, upon rejection of work for noncompliance with the contract, to take steps, by contract or otherwise, to complete the work and make it conform to the contract; the city being under no duty to contractor to cause work to be completed.—Id.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief in this is to keep our readers in touch with all the current literature on municipal matters. In addition to the titles, where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article. Also the name and the place of publication of the periodical in which it appeared.

ROADS AND STREETS.

Engineering:

Highway Engineering. Relation between highway and railway engineering; growth of motor vehicle transportation; its effects upon engineering practice in highway work; opportunities in road engineering. By W. G. Thompson, state hwy. engr. of New Jersey, in address before American Assn. of Engineers. 1500 words. Good Roads, Oct. 1, New York.

Some Suggestions for Highway Designs. Connecting state systems; combining materials; specific tests recommended. By G. W. Tillson, La Grange, Ill. 1550 words. Municipal and County Engineering, October, Indianapolis, Ind.

Course in Highway Engineering and Transport. University of Michigan is offering short-period graduate course. 200 words. Municipal Journal and Public Works, Oct. 25, New York.

Proposed Schedule of Salaries for State Highway Engineers. Preliminary report of American Association of Engineers' Committee submitted for discussion before adoption. 1000 words. Engineering News-Record, Oct. 2, New York.

Construction:

Construction of Portland Cement Concrete Pavement Foundations. Careful construction important; consistency and thorough mixing; curing. By J. W. Routh, Bureau of Municipal Research, Rochester, N. Y. 6 ills., 2300 words. Municipal and County Engineering, October, Ineiapolis, Ind.

Large Paving Mixer Puts in 180-Yard Slab Every Hour. Bulk cement is clamshelled from gondola cars to bins; boxes carrying proportioned batches crane-charged into mixer. 5 ills., 1400 words. Engineering News-Record, Oct. 2, New York.

Constructing Pavements by Halves. Discussion of construction details governing work of laying various types of hard-surfaced pavements by halves. By W. L. Hempelmann, engr. Middle Western Division, Asphalt Sales Dept., Taxas Co. 2 ills., 1600 words. Good Roads, Oct, 15, New York.

Convict Labor Builds Concrete Road in West Virgina. 500 words. Southern Good Roads, October, Lexington, N. C.

Machines Take Place of Men on 20-Mile Concrete Road. Grading, sub-grading and slab construction are machine operations on Lincoln highway from Dekalb to Geneva, Ill. 4 ills., 2300 words. Engineering News-Record, Oct. 2, New York.

Financial:

Highway Expenditures in 1918. Data compiled by Bureau of Public Roads indicate total expenditure of $300,000,000 on country's rural roads. By A. P. Anderson, hwy. engr., Office of Public Roads, U. S. Dept. of Agriculture. 3 tables, 3000 words. Good Roads, Oct. 8, New York.

Paving Prices in New Orleans. 100 words. Municipal Journal and Public Works, Oct. 18, New York.

A State Bond Issue for Highway System. Address before Virginia Good Roads Ass'n by Hon. B. Page, second auditor. 2000 words. Southern Good Roads, October, Lexington, N. C.

Unlimited Funds for Road Construction. Total amount available for hard-surface highways in 1920 is $633,000,000. 500 words. Municipal Journal and Public Works, Oct. 25, New York.

Road Contracts Being Completed in Kansas Refute False Statements About Highway Costs. Reprinted from August number of Kansas Highways, official state highway organ. 900 words. Municipal and County Engineering, October, Indianapolis, Ind.

High Cost in Highway Maintenance. Excerpts of paper by F. S. Greene, New York State Commissioner of highways, on high cost of maintenance of light macadam roads 1000 words. Modern City, October, Baltimore, Md.

Bituminous:

Tarred Roads and Horse Traffic. Horse owners have genuine grievance. Editorial. 500 words. Municipal Engineering and Sanitary Record, Oct. 23, London, England.

Characteristics of Bitoslag Pavement. Representative installations. By J. R. Draney, Bitoslag Paving Co., N. Y. C. 1000 words. Municipal and County Engineering, October, Indianapolis, Ind.

Tarred Limestone Macadam. Should be used to greater extent than at present. Discussion of paper by W. H. Lintern entitled "Notes on the Problem of Road Construction," at meeting of Ass'n of Somersetshire Surveyors. 2000 words. Municipal Engineering and Sanitary Record, Oct. 2, London, England.

Concrete

Resurfacing Concrete Pavement. Description of how two steel bridges in Tiogo county, N. J., were resurfaced by method that might be applied to roads also. 300 words. Municipal Journal and Public Works, Oct. 11, New York.

Paving Alley with Concrete. Method of overcoming difficulties of work at Covington, Ky., worked out by Metzel & O'Hearn, and adopted as standard by the city engineer. 1 ill., 300 words. Municipal Journal and Public Works, Oct. 18, New York.

Significance of Cracks in Reinforced Concrete Construction. 800 words. Engineering and Contracting, Oct. 22, Chicago.

Concrete in Road Building. Paper before N. C. Good Roads Association, by A. N. Johnson, consltg. highway engr., Portland Cement Association. 1600 words. Southern Good Roads, October, Lexington, N. C.

Other Materials:

Macadam Construction of Primary and Secondary Feeder Highways. By W. C. Buetow, div. engr., Wisconsin Highway Commission, LaCrosse, Wis. 2300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Stone and Gravel Road Construction in Ontario. By J. G. Wilson, county road supt., Halton, Ont. 1300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Earth Road Work in a Nebraska County. Hall county's experience in carrying out a contract for a 32-mile job has demonstrated that earth roads can be built for 36c. per cubic yard and that counties succeed in contracting to do their own state and federal aid work. From monthly report of Nebraska Department of Public Works. 2300 words. Good Roads, Oct. 15, New York.

Hard Surface Roads. Paper before N. C. Good Roads Ass'n, by E. J. Wulff, U. S. Bureau of Public Roads. 5300 words. Southern Good Roads, October, Lexington, N. C.

Paving North Carolina State Roads. Suggestion of types preferred by state given out in "notice to contractors" by W. S. Fallis, state hwy. engr. 150 words. Municipal Journal and Public Works, Oct. 11, New York.

Shade Trees

Shade Trees in Public Roads. Editorial with reference to "Arbor Day" movement in United States. 300 words. Municipal Engineering and Sanitary Record, Sept. 25, London, England.

Suitable Trees for Roads. Editorial. 300 words. Municipal Engineering and Sanitary Record, Sept. 25, London, Eng.

Shade Trees and Their Value. Growth must be controlled by judicious pruning. Editorial. 400 words. Municipal Engineering and Sanitary Record, Oct. 30, London, England.

Miscellaneous:

Trustees Plan for Real Highway. Report of meeting of trustees of Central Highway, Greensboro, N. C., by G. G. Dickson. 1500 words. Southern Good Roads, October, Lexington, N. C.

Central Highway a Great North Carolina Boulevard. By Hon. J. H. Pou, Raleigh. 1 ill., 1900 words. Southern Good Roads, October, Lexington, N. C.

The Need of the Nation. National highway system built and maintained by the federal government most urgent need of nation; mileages required in various systems; solution of problem the Townsend Road Bill. By M. O. Eldridge, dir. off roads, American Automobile Assn's. 1400 words. Good Roads, Oct. 1, New York.

Big Wages for Roadmen and Dustmen, Low Wages for Officials. Is It the Definite Policy of Labor? Letter to the editor. 500 words. Municipal Engineering and Sanitary Record, Oct. 30, London, England.

Arguments Favoring National System of Improved Highways, Constructed, Maintained and Financed with Federal Funds. By M. O. Eldridge, Director of Roads, American Automobile Ass'n, Washington, D. C. 1400 words. Municipal and County Engineering, October, Indianapolis, Ind.

Property Owners Not to Select Paving. Resolution adopted at recent special meeting of N. J. Ass'n of County Engrs. 300 words. Municipal Journal and Public Works, Oct. 11, New York.

Considerations Affecting the Choice of Highway Culvert Materials in Oklahoma. By M. L. Cunningham, state engr., of Oklahoma City. 800 words. Municipal and County Engineering, October, Indianapolis, Ind.

Some Notes on English Highway Construction. By H. T. Chapman, county surveyor, Kent, from "The Surveyor," London, July 11. 1800 words. Engineering and Contracting, Oct. 29, Chicago.

Concrete Foundations to Wood Paving. Is it necessary to break up solid concrete? Some questions asked by a borough surveyor. 400 words. Municipal Engineering and Sanitary Record, Oct. 2, London, England.

Salvage of Concrete Road Foundations. Editorial and two letters from surveyors in answer to question by borough surveyor in Oct. 9th issue as to necessity of breaking solid concrete when renewing wood pavement. 1000 words. Municipal Engineering and Sanitary Record, Oct. 9, London, England.

Classification of Highways. Should be classified as to their availability to render greatest public service. Paper before N. C. Good Roads Ass'n, by H. G. Shirley, secy. Highways Industries Ass'n and Federal Highway Council. 2700 words. Southern Good Roads, October, Lexington, N. C.

Let 1920 Road Contracts Now. By middle of February contractors should be able to place orders for materials and make preparations for season's work. 300 words. Municipal Journal and Public Works, Oct. 25, New York.

Recommended Procedure in Design, Construction and Maintenance of Asphalt Macadam Pavements. By Prevost Hubbard, chem. engr., The Asphalt Ass'n, N. Y. C. 6500 words. Municipal and County Engineering, October, Indianapolis, Ind.

SEWERAGE AND SANITATION.

Sewerage Systems:

Town Sewerage. Local government requirements; ventilation of sewers; flushing sewers; general "lay-out"; volume of flow to be provided for; position of sewers in roadways; separation of storm-water; pumping. Paper by E. B. Savage, engr. in charge of sewers and rivers dept., corporation of Birmingham, and discussion, at meeting of Institution of Municipal and County Engineers. 11 ills., 10,500 words. Journal of above Institution, Sept. 13, London, England.

Separation of Storm Water and Sewage. By E. B. Savage, engr. in charge of sewers, Birmingham, Eng. From "Proceedings In-

stitute of Municipal and County Engineers." 400 words. Engineering and Contracting, Oct. 29, Chicago.

Cost of Constructing Sewers and Water Mains in Montreal South, Que. By E. Drinkwater, consltt. engr., Montreal, from "Engineering and Contracting," 800 words. Canadian Engineer, Oct. 30, Toronto, Can.

More Engineering on Sewer Inlets. St. Louis types of inlets; theoretical analysis off intakes; tests on detailed shape and position of fsump. By W. W. Horner, chief engr., Sewers and Paving, city hall, St. Louis. 14 ills., 1700 words. Municipal and County Engineering, October, Indianapolis, Ind.

Causes of Offensive Odors from Sewers and Remedial Measures. By E. B. Savage, engr. in charge of sewers, Birmingham, Eng., from paper before Institute of Municipal and County Engineers. 1800 words. Engineering and Contracting, Oct. 29, Chicago.

Traps:

The Intercepting Trap and New Housing Schemes. Editorial. 500 words. Peter Fyfe, director of housing, on excessive trapping. 400 words. Non-provision advocated with well ventilated sewers. 300 words. Municipal Engineering and Sanitary Record, Sept. 25, London, England.

The Intercepting Trap. Drains connected to old sewer. Letter from N. P. Jasper, resident engr. to London Sanitary Protection Ass'n. 400 words. Unsealing of Traps by Momentum, Evaporation, etc. Letter from H. Davis. 300 words. Municipal Engineering and Sanitary Record, Oct. 9, London, Eng.

The Intercepting Trap. Letter from G. Thomson, with reference to his paper at Perth Sanitary Congress and discussion thereof. 800 words. Municipal Engineering and Sanitary Record, Oct. 23, London, England.

Sewage Treatment:

Sewage Clarification Tank at Auguste Victoria Colliery. By W. Havercamp, from "Water and Water Engineering," London, Sept. 20. 2 ills., 700 words. Engineering and Contracting, Oct. 29, Chicago.

Bridgeport's Sewage, Screen and Pumping Station. Description of underground station, disc screen and centrifugal pumping plant now under construction. By J. A. McElroy, city engr., Bridgeport 2 ills., 1500 words. Municipal Journal and Public Works, Oct. 11, New York.

Utilizing Sewage Sludge. Editorial reference to article in this issue on sludge utilization in England. 300 words. Municipal Journal and Public Works, Oct. 11, New York.

Sludge Utilization in England. Report of Governmental Committee on utilization of sludge; recovery of grease and nitrogen. 700 words. Municipal Journal and Public Works, Oct. 11, New York.

Utilization of Sewage Sludge. Summary of results and conclusion from experiments conducted for several years at Birmingham, England; digestion of sludge in separate tanks in two stages; avoidance of odor. By J. D. Watson in paper before Institute of Municipal and County Engrs. 3 ills., 400 words Municipal Journal and Public Works, Oct. 4, New York.

Birmingham Sewage Experiments. Editorial reference to Mr. Watson's report in this issue. 200 words. Municipal Journal and Public Works, Oct. 4, New York.

Operating Results of "Direct Oxidation" Experimental Sewage Treatment Plant at Easton, Pa. 1 ill., 4500 words. Canadian Engineer, Oct. 16, Toronto, Ont.

Utilization of Sewage Sludge. Paper before Institution of Municipal and County Engineers of Great Britain. By J. D. Watson, engr., Birmingham, Eng. 7 ills., 5000 words. Canadian Engineer, Oct. 30, Toronto, Can.

Montezuma Sewage Treatment. Some unusual features of a small plant; itemized cost of earthwork, concrete, filter media and drains. 700 words. Municipal Journal and Public Works, Oct. 18, New York .

Miscellaneous:

Hydraulic Alignment Diagrams. Diagram of hydraulic mean depth of trapezoidal channels; diagram of flow at two-thirds full depth in circular and eggshaped sewers. By D. H. Thompson, M. A., Canterbury. (Continued). 400 words. 2 pages diagrams. Water and Water Engineering, Oct. 20, London, England.

Walkerville Underground Sewage-Pumping Plant. Circular, two-story, reinforced concrete structure, approximately 23 feet diameter and 20 feet high, built entirely below ground level excepting housing for stairway; lower compartment, containing pumps, encircled by suction well and force main. By C. W. Tarr, deputy chief engr., Morris Knowles, Ltd., Windsor, Ont. 7 ills., 800 words. Canadian Engineer, Oct 30, Toronto, Can.

Mosquito Control for the Municipality. Draining wet lands, pools and other places to prevent breeding; clearing out channels and denuding shores; filling in low spots; methods of operation and approximate cost. By W. A. Hardenbergh, ass't sanitary engr., U. S. Public Health Service. 10 ills, 4200 words. Municipal Journal and Public Works, Oct. 18, New York.

City Engineering and Mosquito Control. Editorial reference to article in this issue. 200 words. Municipal Journal and Public Works, Oct. 18, New York.

WATER SUPPLY.

Meters and Waste Prevention:

Metering and Water Consumption. Three elements seldom taken in account are: Pressure upon water system; extent of house connections with sanitary sewers; effective size of mains and services. Excerpts of paper before Western Society of Engrs., by H. P. T. Matte, chief sanitary engr., Illinois State Dept. of Public Health. 1500 words. Engineering World, Oct. 1, Chicago.

Sizes of Meters. Practice of Interstate Water Co. of Danville in fixing meter sizes; smaller sizes preferable. 700 words. Municipal Journal and Public Works, Oct. 11, New York.

Water Waste Prevention Should be Continuous. Editorial. 300 words. Municipal Journal and Public Works, Oct. 25, New York.

Water Waste Prevention Surveys in Washington. Have saved a waste of 45 million gallons daily; description of plan and organization by which this has been effected during 13 years of continuous investigation. By P. Lanham, engr. in charge of Div. of Water Survey. 11 ills., 3200 words. Municipal Journal and Public Works, Oct. 25, New York.

Meters Disclose Previous Waste of Millions of Cubic Feet a Year, at Middletown, O. 400 words. Fire and Water Engineering, October, New York.

Philadelphia Fights Water Waste. Successful campaign on broad lines; indispensability of Pitot recorders; their elasticity; high voltage difficulties experienced; annual cost insignificant and value of data great. 8 ills., 1800 words. Fire and Water Engineering, October, New York.

Pumping

Improved Efficiency of Modern Pumping Units Shown. Latest installation at Minneapolis water works also shows savings of central-station service. 4 ills., 1200 words. Electrical Review, Oct. 18, Chicago.

Tests of a Unaflow Pumping Engine. Information abstracted from paper before New England Water Works Association, by A. Decrow of the Worthington Pump and Machinery Corporation, N. Y. 2 ills., 1000 words. Municipal Journal and Public Works, Oct. 25, New York.

Test of Riverdale Pump, Toronto. Efficiency, B. H. P. and head-gallon curves. By T. M. Jones, chief engr., Bawden Pump Co., Ltd., Toronto. 2 ills., 500 words. Canadian Engineer, Oct. 330, Toronto, Can.

Considerations Affecting Choice of Pumps for Small Water Works. Comparative fuel and first costs of various types of pumping plants for small water works. By H. A. Symonds, Boston, Mass. 1 table, 2200 words. Municipal and County Engineering, October, Indianapolis, Ind.

Purification:

New Type of Lime and Soda Softening Plant for Water Purification. From "The Surveyor," London, Aug. 15. 2 ills., 1000 words. Engineering and Contracting, Oct. 29, Chicago.

Rotary Water Screens. Being used very successfully in city water department, St. Paul, Minn., for removing solid particles and vegetation from drinking water. By L. N. Thompson, dept. engr., St. Paul. 1 ill., 500 words. Canadian Engineer, Oct. 30, Toronto, Can.

Features of Desrumaux System of Water Filtration. 200 words. Engineering and Contracting, Oct. 29, Chicago.

Toronto Drifting Sand Filters. Description of filter and its principle of operation; some details of operation; variations in turbidity cause difficulties; bacterial results obtained; policy of operation. 5 ills., 1 table, 1800 words. Municipal Journal and Public Works, Oct. 11, New York.

Separation of Solids ffrom Liquids. Gravity filtration, pressure and suction filtration. Abstract of paper by B. G. McLellan, before Society of Chemical Industries. 1200 words. Water and Water Engineering, Oct. 20, London, Eng.

Water Purification at Buffalo, N. Y. Present and prospective. By H. F. Wagner, chemist, Bureau of Water, Dept. of Public Workks, Buffalo. 1300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Some Observations and Experiences in the Operation of Coagulating Basins. Paper before American Water Works Ass'n, by J. W. Armstrong, filtration engr., Baltimore, Md. 5 ills., 1700 words. Canadian Engineer, Oct. 23, Toronto, Can.

Proposed Water Filtration at Detroit, Mich. Experimental filter plant; recommended plant; estimated cost of filtration. 1500 words. Municipal and County Engineering, October, Indianapolis, Ind.

Chlorination of Water Supplies. Discussion of a book by Jos. Race, city bacteriologist and chemist, Ottawa, entitled "Chlorination of Water." 2500 words. Water and Water Engineering, Oct. 20, London, England.

Crenothrix Removal by Chlorine. Conclusions from paper before Indiana Sanitary and Water Supply Ass'n, by W. F. Montfort, consit. engr., St. Louis. 500 words. Municipal Journal and Public Works, Oct. 11, New York.

Some Peculiarities of Algal Growths in Reservoirs. Editorial in "The Engineer," London, Sept. 5. 1800 words. Engineering and Contracting, Oct. 29, Chicago.

Ozone as a Disinfectant in Water Purification. By J. W. Ellms, consulting and sanitary engr., Cleveland O. 1800 words. Municipal and County Engineering, October Indianapolis, Ind.

Pipe Lines

The Coolgardie Pipe Corrosion. This line consists of 351½ miles of 30-inch steel pipe, and a great amount of attention has been given to examination of causes of corrosion. Reference to paper and discussion in Proceedings of Institution of Civil Engrs. 2000 words. Water and Water Engineering, Sept. 20, London, England.

Locating Water Main Leak. Describing method devised by Howard White, of Graham, Anderson, Probst & White, archts., Chicago. 1 ill., 300 words. Municipal Journal and Public Works, Oct. 4, New York.

Water Supply for the Cantonments. Use of wood pipe for distribution systems; details of joints and other special features; national guard and embarcation camps. (Concluded.) 4000 words. Municipal Journal and Public Wcrks, Oct. 18, New York.

Assessment for Water Main Extensions in Los Angeles, Cal. 400 words. Engineering News Record, Oct. 2, New York.

Miscellaneous

Cost Data on Small Water Works Systems. Table of expenditures for water supply systems in small cities and villages in 1919. By W. Artingstall, consulting engr., Chicago. 300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Water Engineering Problems in India. More important directions in which it is possible to develop water resources. 2500 words. Water and Water Engineering, Sept. 26, London, England.

World's Largest Dam. Australian reservoir to contain 272,250,000,000 gallons. water stored for irrigation purposes. 1600 words. Engineering World, Oct. 15, Chicago.

Field Surveys of Water. Director of Division of Sanitation of Minnesota State Board of Health, reported that of 344 unsatisfactory water supplies, field surveys alone revealed 40%. 150 words. Municipal Journal and Public Works, Oct. 11, New York.

Water Supply for the Cantonments. Preparing plans under emergency conditions; quantity provided and actual consumption; standard plans for distribution systems and other features. 1 ill., 2300 words. Municipal Journal and Public Works, Oct. 11, New York.

Stream Flow and Percolation Water. Comparison of peaks of a stream; conditions affecting shape of flow curves and percolation discharge; factors affecting surface run-off. By S. Hall, ass't water engr., Belfast. From Journal of Institution of Water Engrs. of Great Britain. 5 ills., 6000 words. Engineering and Contracting, Oct. 29, Chicago.

The New England Water Works Association Convention. Interesting and instructive papers thoroughly discussed; unusually well planned entertainment program; excellent attendance and well displayed exhibits. 2 ills., 8000 words. Fire and Water Engineering, October, New York.

New England Water Works Association Convention at Albany. Condensed report of the several sessions; reports of committees, papers read and discussions; reservoirs, standpipes, mains, meters, engines and other features considered. 4000 words. Municipal Journal and Public Works, Oct. 4, New York.

Wind Pressures and Wind Stresses in Tower Design. Towers for water tanks, viaducts, wireless aerials and power-transmission lines; six and eight-post towers; wind pressures for design; working stresses for three classes of transmission towers. By R. Fleming, American Bridge Co., N. Y. C. 2 ills., 5000 words. Engineering News-Record, Oct. 2, New York.

LIGHTING AND POWER.

Street Lighting:

Street Lighting and Traffic Accidents. Analysis of year's traffic accidents in Cleveland as to time of day and season shows large percentage due to lack of light; value of good street lighting shown. By Ward Harrison, illuminating engr., Natl. Lamp Works of General Electric Co. 2 ills., 800 words. Electrical Review, Oct. 11, Chicago.

Development of Chicago Street-Lighting System. Progress made by department of electricity; metallic flame lamps. Paper before International Ass'n of Municipal Electricians, by Wm. G. Kieth, commissioner of gas and electricity, Chicago. 2800 words. Electrical Review, Oct. 4., Chicago.

Street Lighting Problem of City of St. Louis. The type "C" series Tungsten 1000 watt lamp; annual cost of lighting "arc" district; gas and naptha sections; municipal ownership suggested. By R. T. Toensfeldt, electrical engr., Department of Public Utilities, St. Louis. 2700 words. Municipal and County Engineering, October, Indianapolis, Ind.

Hydro-electric:

Hydroelectric Power Development in British Empire. Further report of British water-power committee on status and plans for development in colonies, etc. 1500 words. Electrical Review; Oct. 11, Chicago.

Hydroelectric Development on Wisconsin River at Stevens Point. Description of development; interesting instance where load was developed with generating station; interconnection of systems. By Wm. F. Snyder, electrical supt., Consolidated Water Power & Paper Co. 5 ills., 2200 words. Engineering World, Oct. 1, Chicago.

Solving Hydro-Electric Problems of a Small Town. Stable unit secured after two failures; advantage taken of deep, washed-out draft pit to use vertical cone tube. 2 ills., 1200 words. Engineering News-Record, Oct. 2, New York.

Development and Storage of Water for Electrical Purposes. Conditions requisite for water power; flow and storage; rainfall and run-off; evaporation and percolation; reservoirs. Abstract of paper before Institution of Electrical Engineers, by J. W. Mears. 3 ills., 4000 words. Water and Water Engineering, Sept. 20, London, England.

Development and Storage of Water for Electrical Purposes. Lay-out of hydroelectric schemes. head works and clear water. Abstract of paper before Institution of Electrical Engineers, by J. W. Mears. (Continued). 1 ill., 2500 words. Water and Water Engineering Oct. 20, London, England.

Pressures in Penstocks Caused by the Gradual Closing of Turbine Gates. With reference to discussion of N. R. Gibson's paper (see Sept. 4 and 11th issues of Canadian Engineer) by R. D. Johnson, cons. engr., N. Y. C. 2 ills. 13300 words. Canadian Engineer, Oct. 16, Toronto, Ont.

Pressures in Penstocks Caused by Gradual Closing of Turbine Gates. Discussion of paper at American Society of Civil Engrs. by N. R. Gibson. By Ford Kurtz, Muscle Shoals. Ala. 1 table, 1100 words. Canadian Engineer, Oct. 23. Toronto, Can.

Pressures in Penstocks Caused by the Gradual Closing of Turbine Gates. Discussion of N. R. Gibson's paper before American Society of Civ. Engrs. By J. T. Noble Anderson. 300 words. Canadian Engineer, Oct. 30, Toronto. Can.

How to Reconstruct Small Water Power Plants. By R. K. Holland, consulting engr., Ann Arbor, Mich. 3600 words. Municipal and County Engineering, October, Indianapolis, Ind.

Gas

New Standards for Gas Service in California. Rules for gas service of railroad commission went into effect Sept. 1 and are thought to represent latest ideas upon this subject. 3500 words. Gas Age, Oct. 1, New York.

New York Welcomes the Gas Men of the Nation. What is to be seen in great metropolis while attending most important conference ever held in gas industry. 9 ills., 1500 words. Gas Age, Oct. 1, New York.

Making of Cement Joints for Cast Iron Pipe. Paper before convention of Pacific Coast Gas Ass'n, by W. M. Henderson, San Francisco. 2 ills., 1 table, 1100 words. Gas Age, Oct. 15, New York.

Ten Vital Points for Gas Association of America may make its resources count for most, summarized by Secretary Wm. B. Way. By E. C. Jennings, director, Pittsburgh Bureau, Gas Age. 1 ill., 1000 words. Gas Age, Oct. 1, New York.

Vital Issues Affecting Gas Industry Today. Address by president of Pacific Coast Gas Ass'n, J. D. Kuster, San Jose, Cal. 5500 words. Gas Age, Oct. 15, New York.

Miscellaneous:

Central-Station Rates in Theory and Practice. (13th article). Differentiating between classes of service; value of service according to size of customers and use; isolated plants and other competition in light, power and heat. 4000 words, Oct. 4. (14th article). Rate systems and reasons therefor; class schedules commonly used; minimum and maximum charges, discounts and related features; principal types of rates. 1 ill., 4000 words, Oct. 11. (15th article) Defects of straight meter rate; why large consumers deserve lower rates; detailed study of step meter rate. 8 ills., 5500 words, Oct. 18. (16th article). Block meter rate and its combination with other rates; customer charges; detailed studies of block rates and combinations; average charges with meter rates. 12 ills., 3000 words, Oct. 25. By H. E. Eisenmenger. Electrical Review, Chicago.

Equipment for Handling Coal and Ashes in Power Plants. Influence of methods upon plant operation; classification of mechanical methods of handling coal and ashes; power calculations. By Rob. June, mechanical engr. 1 ill., 2,000 words. Electrical Review, Oct. 25, Chicago.

Coal and Public Utilities. Part of wisdom to use, for public utilities, sources of power other than coal that nature has provided for locality in question. 300 words. Municipal Journal and Public Works, Oct. 25, New York.

Methods of Increasing Capacity of Existing Transmission Lines. Line limitations determining relative costs of increasing capacity. Paper before Pennsylvania Ass'n, by E. C. Stone, Duquesne Light Co. 6 ills., 1 table, 3500 words. Electrical Review, Oct. 4, Chicago.

What Electricity Has Done to Help Humanity. extremely varied and indispensable services performed by electricity in war; value of Niagara Falls hydro-electric development. By J. C. McQuiston, mgr., dept. of publicity, Westinghouse Electric & Mfg. Co. 1 ill., 2000 words. Electrical Review, Oct. 18, Chicago.

New Form of Tank for Static Transformers. Importance of preventing moisture from entering tank and lowering dielectric value of oil; how conservator type of tank prevents this and also explosion risk and sludging of oil. 7 ills., 1700 words. Electrical Review, Oct. 18, Chicago.

Chicago Electrical Show Proves a Noteworthy Success. Elaborate decorative and lighting effects are features of show; all branches of industry make representative exhibit of electrical products. 3 ills., 3000 words. Electrical Review, Oct. 18, Chicago.

Northwest Electric Power Men Hold Important Convention. Central-station delegates from four states and many visitors meet at Seattle; papers and discussions deal with vital problems. By W. A. Scott. 1 ill., 5500 words. Electrical Review, Oct. 11, Chicago.

National Association of Electrical Inspectors Holds Convention at Springfield. Revision of national electrical code from field data principal topic at reconstruction meeting. 5000 words. Electrical Review, Oct. 25, Chicago.

REFUSE DISPOSAL.

Public Cleansing Matters. Salvage at a Scottish Sanitary Conference. Pig-breeding possibilities. Paper by Wm. Asher, sanitary inspector, Perth. 700 words. Municipal Engineering and Sanitary Record, Sept. 25, London, England.

Public Cleansing Matters. Destructors and use of clinker; house refuse used for sewage filters at Chester. By a superintendent. 600 words. Municipal Engineering and Sanitary Record, Oct. 23, London, England.

Collection and Disposal of Refuse. Choice of trucks; tipping and loading; position of ash bins. By F. W. Brookman, cleansing supt. Rochdale, from "The Surveyor," London, July 11. 1700 words. Engineering and Contracting, Oct. 29, Chicago.

Contract for Garbage Disposal by Feeding Awarded by Newark, N. Y. By J. W. Costello, engrg. superviser, Newark. 1 ills., 700 words. Municipal and County Engineering, October, Indianapolis, Ind.

FIRE DEPARTMENT.

New York Fire College Course. Fire Streams, Nozzles and Hose Lines. Auxiliary fire appliances in service; perforated pipe systems; sprinkler systems. 2 ills., 2800 words. Fire and Water Engineering, October, New York.

Fire Alarm and Police Control. Figures from report for 1917 of U. S. Census Bureau. 400 words. Municipal Journal and Public Works, October 4, New York.

National Fire Brigades Union. Autumn conference at Oxford, Eng. Possibilities of Petrol-electric Motor for Fire Brigade Work, paper by H. H. Carter. Can Standard of Competitions Be Improved to Promote Greater Efficiency? Paper by Chief Officer S. W. Thorpe. 3000 words. Municipal Engineering and Sanitary Record, Sept. 25, London, Eng.

Fire Prevention at Bridgeport. Chamber of Commerce takes initiative in fostering endeavor to reduce fire loss; address by Capt. Gasser, Newark. 2 ills., 2000 words. Fire and Water Engineering, October, New York.

Pacific Coast Chiefs' Convention. A further account of annual meeting of the association; interesting discussion on tires. By H. W. Bringhurst, secy. 1100 words. Fire and Water Engineering, October, New York.

CITY PLANNING.

Planning of Residential Suburbs with Special Reference to Engineering Features. By F. L. Olmsted, landscape archt., Brookline, Mass. 4300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Solution of the Housing Problem. Causes of existing evils; eradication and recurrence of housing evils directed and prevented by national housing scheme; ideals governing development of community; relation between federal, provincial and local government. 10 ills., 6700 words. Western Municipal News, October, Winnipeg, Manitoba.

Joint Town-Planning Conference at Ottawa. Americant City Planning Institute and Town-Planning Institute of Canada discuss zoning, cost of public utilities and street improvements, proper widths for streets and other fundamental considerations of city and town planning. Papers by F. L. Olmsted, chf. town planner for U. S. Dept. of Labor; Morris Knowles, consult. engr., Pittsburgh, Pa.; B. A. Haldeman, advisory engr., Zoning Comn., Philadelphia, Pa.; E. M. Bassett, chn., Zoning Committee, N. Y. C. 6000 words. Canadian Engineer, Oct. 23, Toronto, Can.

GOVERNMENT AND FINANCE.

Advantages and Limitations of Commission Government. Subject discussed in bulletin of Bureau of Municipal Research, of Toronto, Ont. 700 words. Municipal Journal and Public Works, Oct. 4, New York.

How to Finance Public Improvements in Illinois Villages. Four methods of raising money; special assessment for local improvements; statutory authority. By W. Artingstall, consulting engr., Chicago, Municipal and County Engineering, October, Indianapolis, Ind.

Some Common Errors in Municipal Financing. Lack of modern accounting methods; improper handling of bond issues; failure properly to regulate franchises. By A. R. Hebenstreit, city manager, Albuquerque, N. Mex. 1100 words. Municipal and County Engineering, October, Indianapolis, Ind.

Why Municipal Expense and Income Data Are Usually Deceptive. 1100 words. Engineering and Contracting, Oct. 22, Chicago.

STRUCTURES AND MATERIALS.

Strength of Malleable Iron. Relation between strength of a specimen and its position in a casting. 3 ills., 2000 words. Engineering World, Oct. 1, Chicago.

Geology of Concrete Aggregates with Special Reference to Texture. By Prof. P. G. H. Boswell, from "Concrete and Constructional Engineering," London. 4000 words. Engineering and Contracting, Oct. 29, Chicago.

Wood as Reinforcement for Concrete. From "Beton u. Eisen," 1919. 2 ills., 500 words. Engineering and Contracting, Oct. 29, Chicago.

(*Continued on page 288.*)

NEWS OF THE SOCIETIES

Dec. 10. AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual convention, Louisville, Ky.

Dec. 25. AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, New York City. Secretary, Calvin W. Rice, 29 West 39 st., New York City.

Feb. 9-13, 1920.—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

May 18-21, 1920. NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Pasadena, Cal. Acting Secretary, S. A. Sewall, 29 West 39 st., New York City.

American Association of Engineers

The American Association of Engineers announces a membership drive during the first two weeks of December. There will be nine thousand "salesmen," ninety branch sales offices, and four district "sales offices." The method to be employed is similar to that used in obtaining subscriptions to the Liberty Loans. The ninety clubs and chapters will divide their members into membership teams, each with certain territory to cover, and under the supervision of a team captain. The drive will be handled for each chapter by a drive commander who will keep in direct touch with the national headquarters of the Association by telegraph. He will make telegraph reports of the number of applications obtained each day. A force will be maintained at the national headquarters to tabulate the returns and to advise the chapters of their standings.

For the purpose of competition chapters and clubs will be divided into two groups: those having more than one hundred members at midnight on December 13th, when the drive ends, and those having less than one hundred members on that date. A special gavel will be presented to the chapter of club in the latter group which has the greatest percentage of increase of membership during the drive. Of the chapters having one hundred or more members at the end of the drive, official A. A. E. colors will be presented to the one that has obtained the greatest percentage membership increase during the drive.

The three members securing the greatest number of applications between the first and thirtenth of December, inclusive, will be awarded respec tively a life membership in A. A. E., a collection of books to the value of $100, and a watch of the value of $50. The captain of the membership team in each chapter or club which obtains the greatest number of applications of all the teams in that chapter of club will be awarded a solid gold, engraved, A. A. E. watch fob. Individual chapters and clubs may award special prizes to their members.

The referee of the drive is Isham Randolph, consulting engineer of Chicago.

With a membership of almost 8500 at the end of October, it is probable that the American Association of Engineers will easily pass this year the ten thousand membership mark which was set last spring as a goal for 1919.

The Milwaukee Chapter of the American Association of Engineers has submitted a schedule of salaries for the various engineer employes of the city to the city council. The council did not take definite action on October 21, when the request was presented, but will do so inside of a week or two. The following positions are the principal ones affected by the proposed increases; chief engineer of sewers, office engineer of water department, field engineer of water department, chief draftsman, division engineer of street construction and chief estimating engineer.

The Northwest Society of Highway Engineers has voted unanimously to affiliate with the American Association of Engineers. The vote was informal. After the constitutional amendments which are required are made the affiliation can be formally consummated. It is expected that an amalgamation will be possible in January.

The Southwestern Society of Engineers, of which Dean G. M. Butler of the University of Arizona is president, has recently decided to affiliate with the American Association of Engineers.

The sub-committee of the American Association of Engineers on salaries of engineers in municipal service has been completed with S. C. Hadden, editor of Municipal and County Engineering, as chairman and with the following other members; John Ericson, consulting engineer of the Board of Public Works, Chicago; M. M. O'Shaughnessy, city engineer, San Francisco, California; O. Laurgaard, city engineer, Portland, Oregon; W. W. Horner, chief engineer, St. Louis, Missouri; E. R. Conant, consulting engineer, Savannah, Georgia; Geo. D. Fairtrace, city engineer, Dallas, Texas; Arthur B. Farnham, city engineer, Pittsfield, Massachusetts; George G. Earl, general superintendent, Sewerage and Water Board, New Orleans, Louisiana; F. C. Lohman, city engineer, Champaign, Illinois; L. B. Hitchcock, city engineer, Phoenix, Arizona; Guy H. Stevens, city enginer, Auburn, Maine; E. A. Ziesloft, city engineer, Akron, Ohio; O. E. Carr, city manager, Springfield, Ohio; W. J. Alexander, city manager, Gastonia, North Carolina; W. E. Baldry, city engineer, Topeka, Kansas; John C. Chambers, city engineer, Louisville, Kentucky; Arthur A. Reimer, consulting enginer, East Orange, New Jersey; F. L. Raschig of Cincinnati, Ohio; S. Q. Cannon, city engineer Salt Lake City, Utah.

The committee estimates that there are in the neighborhood of fifteen thousand municipal enginers in the United States. It is expected that a municipal engineering schedule will be issued soon.

National Safety Council.

The formation of an engineering section of the National Safety Council has been authorized by the Executive Committee of the Council and the new section will be organized immediately by a special commitee appointed for the purpose.

In announcing this action, Sidney J. Williams, secretary and chief engineer of the National Safety Council said the decision to form a distinct engineering problems affecting safety work three considerations: first, the growing recognition of the importance of the engineering factor in safety work; the growing interest in safety work on the part of civil, mechanical, electrical, engineers; the growing volume of experience and investigation in the engineering problems involved in safety work.

"The formation of an engineering section," as Mr. Williams points out, "will provide a vehicle for concentration of the engineering brains of the several thousand member companies of the council on the solution of engineering problems affecting safety work in industry.

"The development of the Council has been largely along the lines of industrial sections. The Council now has 19 sections each with its own officers and program and each interested largely in the safety problem of its own particular field. These sections are as follows:

"Automotive, Cement, Chemical, Construction, Education, Electric Railway, Health Service, Marine and Navigation, Metals, Mining, Packers, Paper and Pulp, Public Safety, Public Utilities, Rubber, Steam Railroad, Textile, Women in Industry and Woodworking.

"The greatest contribution of the new engineering section will be with respect to problems that cut across the interests of several sections and affect whole groups of industries as, for instance, the hazards of poisonous dust or gas. The new engineering section will also facilitate contact and co-operation between the various national engineering societies, the engineering departments of the Government and the National Safety Council."

INDUSTRIAL NEWS

Street Cleaning Officials Attend Elgin Conference.

The third annual Elgin conference was held at Chicago and Elgin, October 2, 3 and 4. In connection with this meeting, there was a conference of street cleaning officials, which was attended by about fifty officials. With the exception of two meetings of street cleaning officials held in New York in 1915 and 1916, this was the first meeting of this nature that is on record. Each year, the sales, service, and factory departments of the Elgin organization meet in Chicago for conference.

October 2 was given up to the sessions of the Elgin organization with a reception to the visiting officials at 5 p. m., after which an auto ride was taken around the Chicago Boulevards. A smoker and grill supper were held in the Auditorium Hotel in the evening.

The forenoon of October 3 was taken for the morning session of the Conference of Street Cleaning Officials. This conference was conducted by W. J. Galligan of the street cleaning department of the city of Chicago and N. Goss, commissioner of public works of St. Paul.

These subjects were under discussion: street flushing; dry sweeping; uniforms; hand-brooming vs. machine sweeping; labor conditions—outlook—unions—wages; co-operation of citizens—litter prevention; co-operation of police; snow removal; garbage collection and disposition; ashes and refuse collection and disposition; oiling of pavements; street openings—temporary care.

Headquarters of the Conference were the La Salle Hotel. An auto trip of inspection of interesting features of the public works department of the city of Chicago occupied Friday afternoon. This trip included a visit to the municipal pier, the garbage disposal plant, the city's repair and store yards, etc. There was a trip to the Elgin factory where Elgin machines and auto-sweepers were seen in the making.

A complete report of the meeting is in preparation and will be mailed to anyone interested on application to Elgin Sales Corporation, 501 Fifth Avenue, New York City.

The Goodyear Tire & Rubber Co. employes now have an "Industrial Assembly" consisting off 20 "senators" and 40 "members of the house of representatives" who pass all laws affecting the conduct and welfare of the men. The plan was instituted four months ago and the latest question to be taken up is that of food prices. The Employees' Store Committee of the Industrial Assembly is now buying and selling potatoes under a cooperative plan and other food commodities are being investigated with a view to buying in carload lots.

PERSONALS

Brown, Linn, has been appointed city engineer of Jefferson City, Mo.

Whelan, Joseph A., Trenton, N. J., has been appointed assistant superintendent of the Michigan State Highway Department, with headquarters at Ann Arbor. He was engaged in road-building in Trenton for some time.

Coleman, Roy D., county engineer for Atchison County, Kansas, for several years, has been appointed Government resident engineer for the Atchison district in the construction of hard-surface roads. Robert Kerr has been appointed county engineer.

Legaré, T. Keith, announces that he has resigned the position of city engineer of Columbia, S. C., and has opened an office in the Hook bldg., Columbia, as consulting engineer specializing in highway and municipal engineering. He will act as district engineer for Dow & Smith, consulting paving engineers, for the Sharman Concrete Pipe Co., and the Legare Templet Co.

MUNICIPAL INDEX

(Continued from page 286.)

Geology of Concrete Aggregates. Editorial in "Concrete and Constructional Engineering," London, July. 2000 words. Engineering and Contracting, Oct. 29, Chicago.

Concreting In Cold Weather Offers Strong Advantages to Owners. By A. E. Wells, pres., Wells Bros. Constr. Co. of Canada, Ltd. 1000 words. Canadian Engineer, Oct. 23, Toronto, Can.

Concreting in Cold Weather. By A. E. Wells, pres. Wells Bros. Constr. Co. 1100 words. Engineering and Contracting, Oct. 22, Chicago.

Concrete and Its Application. Conclusions from laboratory experiments; advice as to proportioning concrete. 800 words. Municipal Engineering and Sanitary Record, Oct. 30, London, Eng.

Concreting Procedure on Miami Flood-Control Dams. Equipment and methods standardized for five separate jobs; standard product secured by test control of varying aggregates. 7 ills., 3200 words. Engineering News-Record, Oct. 2, New York.

Concrete I-Beams Used to Make Crib Retaining Wall. Combined flexibility of wood crib with permanence of concrete; developed on Cleveland railroad for soft ground. 4 ills., 700 words. Engineering News-Record, Oct. 2, New York.

Burnt Earth Concrete, with Iron and Wood Reinforcement. By L. P. Hodge from "Engineering," London, Sept. 5. 1 ill., 1900 words. Engineering and Contracting, Oct. 29, Chicago.

Strengthening Old Bridges by Doubling Up the Trusses. 1 ill., 900 words. Engineering and Contracting, Oct. 22 Chicago.

Load Concentrations on Steel Floor-Joists of Wood Floor Highway Bridges. 5 ills., 1500 words. Engineering and Contracting, Oct. 22, Chicago.

Unusual Design and Joint Details of 430-Foot Bridge. Heat-treated steel eyebars and high-carbon steel built-up members used in Warren-type truss for economy in material. 2 ills., 800 words Engineering News-Record, Oct. 2, New York.

Stress Measurement of Bridges. From "The Engineer," London, Aug. 1 and 8. 1 ill., 4000 words. Engineering and Contracting, Oct. 29, Chicago.

Excavation of New York-New Jersey Vehicular Tunnel. By J. F. Springer. 5 ills., 3000 words. Engineering World, Oct. 15, Chicago.

MISCELLANEOUS.

Classification and Salaries of Engineers. Toronto engineers adopt schedule of titles, qualifications and minimum salaries for technically-trained men employed by railways, municipalities, industries, public works and large public utilities; salaries range from $1,200 to $12,000 per annum. 6500 words. Canadian Engineer, Oct. 23, Toronto, Canada.

The Public and the Engineer. Discussion regarding insufficient compensation of engineers, their relation to public affairs, and the oversupply of engineer graduates. By C. Hansel, advisory engr. and investigator, N. Y. C. 2000 words. Engineering News-Record, Oct. 2, New York.

Some Problems Confronting Municipal Engineers in England. Supply of materials; labor difficulties; use of machinery necessary. By C. Brownridge, boro engr., Birkenhead, England. 1300 words. Municipal and County Engineering, October. Indianapolis, Ind.

What the War Has Done for Engineers, and Part Engineers Have to Play in Reconstruction. By Col. R. E. B. Crompton; Abstract of presidential address before Junior Institution of Engineers. 3000 words. Engineering and Contracting, Oct. 29, Chicago.

Reconstruction Problems of British Municipal Engineers. By E. J. Elford, municipal engr., Cardiff. From Journal of Institution of Municipal and County Engineers, London. 1800 words. Engineering and Contracting, Oct. 29, Chicago.

Why Do Most Practicing Engineers Study So Little? Editorial. 2500 words. Engineering and Contracting, Oct. 29, Chicago.

National Department of Public Works vs. Corps of Engineers, U. S. A. By Isham Randolph. 1500 words. Engineering World, Oct. 1, Chicago.

Cost Plus Contract with Minimum Fee Guarantee. 900 words. Engineering and Contracting, Oct. 22, Chicago.

Advantages of Cost Plus Form of Contract. Abstract of address By Brig.-Gen. R. C. Marshall, Jr., Chf. of Constr. Div., U. S. A., Washington, D. C., before Boston Society of Civ. Engrs. 5600 words. Engineering and Contracting, Oct. 22, Chicago.

Cost-Keeping in Cost-Plus Fixed-Fee Contracts. How costs are kept under cost-plus-fixed-fee contract; books kept at job office; open for owner's and architect's inspection. By F. A. Wells, vice-pres. and treas., Wells Bros. Constr. Co., Chicago. 5 ills. 2800 words. Engineering World, Oct. 15, Chicago.

The Overhead Cost in Contracting. What overhead consists of; how to figure overhead and proper selling price of a job. From paper before Master Builders' Ass'n of St. Louis, by Dan Carey. 2600 words. Engineering and Contracting, Oct. 22, Chicago.

Bidding on Public Work. When officials can and can not exercise discretion; must observe provisions under which bids were invited; rejecting all bids. By J. J. Simpson. 2800 words. Municipal Journal and Public Works, Oct. 25, New York.

Sextant and Stadia-Rod Method for Measuring Distance. Topographic mapping of Alaska coast line facilitated by special stadia; accuracy tested with good results. By B. A. Baird, San Francisco. 1600 words. Engineering News-Record Oct. 2, New York.

Transportation Surveys for Rural Motor Express Routes. By J. A. Collins. 2000 words. Southern Good Roads, October, Lexington, N. C.

British Excavating Machinery. By A. E. Collins, city engr., Norwich, Eng., from "Water and Water Engineering," London, Sept. 20. 3 ills., 1800 words. Engineering and Contracting, Oct. 29, Chicago.

School Building Program. Letter by L. D. Upson, director, Detroit Bureau of Governmental Research, in answer to editorial in recent issue of this journal. 300 words. Municipal Journal and Public Works, Oct. 4, New York.

Rules for Drafting Practice. Cover concisely dimensions of drawings, allowable scales, character of lettering and many other points. 1000 words. Canadian Engineer, Oct. 16, Toronto, Ont.

Reconstruction and Civic Development. What we have learned from war and what we can take from Europe; "co-operation" the slogan for reconstruction period. Excerpts from address before Canadian Club of Ottawa, by C. H. Mitchell, dean of faculty of applied science and engrg. University of Toronto. 3000 words. Canadian Engineer, Oct. 30, Toronto, Can.

An Equalizing Reservoir for Labor. Some system should be devised by which occasional labor surplus could be utilized to benefit both laborer and public. 400 words. Municipal Journal and Public Works, Oct. 18, New York.

Houston in the Food Business. City has taken over three stalls in market house. 150 words. Municipal Journal and Public Works, Oct. 25, New York.

Mechanical Device for Reading Curves and Tables. Simplifies determination when charts require simultaneous readings of several elements; charts cleared. 1 ill., 700 words. Engineering News-Record, Oct. 2, New York.

ADVANCE CONTRACT NEWS

ADVANCE INFORMATION
BIDS ASKED FOR

CONTRACTS AWARDED
ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STREETS AND ROADS.

Cal., Los Angeles. 2 pm, Dec. 1.
Improving city street—L. E. Lampton, clk., bd. supervrs.

Fla., Fort Myers. 2.30 pm, Dec. 2.
Following municipal impvts.: 26,000 sq. yd. paving of brick, asphaltic brick blk., asphaltic concr., sheet asphalt or cement concr; 13,500 lin. ft. combined concr., curb and gutter; 4,158 lin. ft. 8 to 24-in. sanitary and storm sewers; 27,482 lin. ft. cast iron class A 4 to 8-in. water mains—J. A. Davison & Son, city engrs.

Ga., Savannah. Nov. 30.
Paving and draining 34,924 yd. hwy. in Chatham co.—W. F. Brown, engr., 310 Estill ave.

Ga., Rome. 2 pm, Dec. 2.
2,848 mi. hard surface pavement (asphaltic macadam) 18-ft. wide in Floyd co. fed. and proj. no 54, involving 0.55 acres clearing and grubbing; 14,627 cu. yd. common and 323.6 cu. yd. borrow excav.; 1,304 lin. ft. 12 to 30-in. D. S. vitr. clay pipe in place; 30,080 sq. yd. asphaltic macadam with macadam base, posts, etc.—J. B. McCrary Co., proj. engrs., 3rd Natl. Bank bldg.,

Ga., Quitman. Dec. 9.
Grading and paving 7 mi. roads in Brooks co.—Garrett & Slack, engr., Montgomery, Ala.

Ind. Indianapolis. 10 am, Nov. 21.
Improving 2 streets by grading and paving roadway—Bd. pub. wks.

Ind., Albion. 2 pm, Dec. 2.
Road in Washington twp., Noble co.—H. C. Erwin, co. aud.

Ind., Bloomfield. 2 pm. Dec. 2.
Macadam road in Highland twp., Green co.—H. Corbin co. aud.

Ind.,, Danville. 2.15 pm, Dec. 12.
Road in Clay and Franklin twpe. and road in Marion twp. Hendricks co.—C. M. Havens co. aud.

Ind., Delphi. 1.30 pm, Dec. 2.
5 gravel roads in Burlington and Democrat twps., Tippecanoe, Rock Creek and Washington, Monroe and Jackson, and Burlington twps.—H. D. Good, co. aud.

Ind. Frankfort. 1.30 pm, Dec. 2.
8,145 ft. gravel road in Jackson twp., Clinton co.—E. Spray, co. aud.

Ind., Jeffersonville. 10 am, Dec. 1.
Macadam road in Washington twp., 14,025 ft. long—G. W. Stoner, aud., Clark co.

Ind., Knox. noon, Dec. 2.
4 roads in Railroad, Washington, Davis and Wayne twps., Starke co.—C. W. Weninger, co. aud.

Ind., Newport. 2 pm, Dec. 1.
3 mi. gravel road in Vermillion twp., Vermillion co.—L. F. Wright, co. aud.

Ind., Plymouth. 1.30 pm, Dec. 2.
12 gravel roads in Marshall co., in following twps.: Center, German, Bourbon, Green, Walnut, Union, Tippecanoe, Polk, West and North twps.—C. H. Weber, co. aud.

Ind., Rensselaer. 2 pm, Dec. 1.
2 stone roads in Newton and Marion twps., Jasper co.—J. P. Hammond, co. aud.

Ind., Rochester. 2 pm, Dec. 2.
4 gravel roads in Aubbenaubbee. Union, Newcastle and Liberty twps., Fulton co.—E. A. Smith, co. aud.

Ind., Salem. 2 pm, Dec. 1.
16,253 ft. road in Gibson twp., Washington co.—E. E. Batt, co. aud.

Ind., Warsaw. 10 am, Dec. 4.
3 conc. roads in Franklin, Tippecanoe and Wayne twps. respectively and 2 gravel roads in Harrison twp.—V. D. inger, co. aud.

Ind., Williamsport. 1 pm, Dec. 1.
15,152 ft. gravel road in Kent twp., Warren co.—W. H. Stephens, co. aud.

Ind., Delphi. 1:30 p. m. Dec. 15.
Gravel road between Carroll and Tippecanoe cos.—R. D. Good, aud., Carroll co.

Ind., Brazil. 10:30 a. m. Dec. 15.
3,953 ft. stone and gravel road between Vigo and Clay cos.; 4 stone and gravel roads in Van Buren (2) Jackson and Harrison twps, and stone road in Washington twp., all in Clay co.—W. E. Parrish, co. aud.

Ind., Lebanon. 10 a. m. Dec. 2.
4 Roads in Jefferson, Sugar Creek (2) and on line between Jefferson and Alter twps.—C. Goodwin, co.

Ind., Huntington. 1 pm, Dec. 6.
Road between Whitley and Huntington co. O. E. Eviston, aud., Huntington.

Ia., Des Moines. 9 am, Dec. 1.
Repaving street and paving street with no. vitr. paving brick, sheet asphalt or bitulithic on portland cement concr. foundation, involving 9,459 sq. yd. and 1,332 sq. yd. pavement respectively; paving alley and parkway and laying sidewalks, involving 4900 sq. yd. 6-in. portland cement concr. for alley, 373 sq. yd. portland cement concr. parkway and 7,375 sq. ft. class sidewalk—Supt., dept. sts. & pub. impvts.

Ia., Fort Dodge. 9 am, Dec. 9
95 yd paving and 65 lin. ft. curbing and guttering (bitulithic, asphalt, or asphaltic concr.—C. H. Reynolds, city engr.

Ia., Odebolt. Dec. 9.
130,000 sq. yd. paving and 70,000 lin. ft. curb and gutter—W. E. Standeven, engr. Omaha, Neb.

Ia., Leon. 8 pm, Dec. 3.
37,000 sq. yd. asphaltic concr., bitulithic, rein. concr., sheet asphalt, or vitr. brick pavement and 20,600 lin. ft. curb and gutter—Shockley Engrg. Co., 740 Reserve Bank bldg., Kansas City, Mo.

Ia., Leon. 8 pm, Dec. 3.
10,000 sq. yd. paving with brick, rein. concr., sheet asphalt, asphalt concr., or bituminous concr., est. $150,000—C. A. Shockley, 740 Reserve Bank bldg., Kansas City, Mo.

Kan. Abilene. 2 pm, Dec. 1.
Fed. aid proj. no. 32 in Grant and Center twps., Dickinson co., involving paving with monolithic brick, bituminous filled brick, bituminous filled brick or 2-course concr., 18 ft. with one 4-ft. and one 10-ft. wide earth shoulders, 23,987 ft. in length; also 20,906 ft. fed. aid proj. no. 29, involving paving with monolithic brick, bituminous filled brick or 2-course concr., 18 ft. wide with 4-ft. wide earth shoulders—H. W. King, co. clk.

Kan., Emporia. 1.30 pm, Nov. 26.
Section of fed. aid proj. no. 30 in Lyon co., 23.00 ft. 18--ft. road of 1 course concr., 2-course concr., monolithic brick, or bituminous filled brick on sand cushion with concr. base, with 5-ft. earth shoulders on each side, etc., involving 16,406 cu. yd. earth 47,400 sq. yd. paving, 639 cu. yd. concr. in culverts and bridges and 25,933 lbs. reinforcing steel—G. L. Miller, co. clk.

Kan., Salina. Dec. 4.
1½ mi. hard road—Bd. co. comrs., Saline co.

La., Leona. 8 pm, Dec. 3.
37,000 sq. yd. pavement and 20,600 lin. ft. curb or curb and gutter—Shockley Engrg. Co., 740 Reserve Bank bldg., Kansas City, Mo., engrs.

La., New Orleans. noon, Dec. 8.
Following sections hwy.: 7.75 mi. Franklin-Thibodaux hwy. in St. May parish; 11.53 mi. Oberlin-Alexandria hwy. in Allen parish; 10.24 mi. Oberlin-Lake Charles hwy. in Allen parish; also 15.96 mi. St. Joseph-Winnsboro hwy. in Tensas parish—Duncan Buie, state hwy. engr., 736 Maison Blanche Annex.

La., South Highlands. Dec. 5.
Paving various vil. streets, involving 65,000 sq. yd. asphaltic concr. (Topeka mix) on concr base, 27,650 lin. ft. concr. curb, 8,100 lin. ft. rein. concr., and 2,600 lin. ft. concr. or vitr. pipe storm sewer—H. E. Barnes, engr., Shreveport.

Mich., Lansing. 10 am, Dec. 2.
Improving 48.503 mi. road in Powell, Champion, Ishpeming, Marquette and Negaunee twps., and Negaunee city, Marquette co., by grading and drainage structures, involving 231 acres clearing; 34,385 sq. yd. grubbing; 474,327 cu. yd. earth, 81,610 cu. yd. loose rock, 5,132 cu. yd. solid rock and 21,778 cu. yd. ditch excav.; 89,202 lin. ft. guard rail; 1,667 cu. yd. retaining wall, (rubble); 63,231 lbs. steel reinforcement in culverts; 12,912 lin. ft. installing corrugated iron culverts, etc.—F. F. Rogers, state hwy. comr.

Mich., Freeman. Nov. 30.
1 mi. 12--ft. class B state reward road and 1½ mi. 12-ft. road in Glare co.—J. W. Wilson, twp. clk.

Mich., Lansing. 1.30 pm, Dec. 1.
Improving 3.884 mi. road. Jackson and Newago cos., consisting of shaping roads, drainage structures and surfacing with gravel to width of 16 ft.—F. F. Rogers, state hwy. comr.

Mich., Lansing. 1.30 pm, Dec. 3.
Improving 3.884 mi. road in Jackson and Ingham cos., consisting of shaping road drainage structures and surfacing with gravel surfacing to width of 16 ft.—F. F. state hwy. comr.

Mich., Lansing. 1.30 pm, Dec. 5.
Improving 9.169 mi. road in Corwith and Livingston twps., Otsego co., consisting of shaping road, drainage structures and gravel surfacing to width of 16 fft.—F. F. Rogers, state hwy. comr.

Mich., Lansing. 1.30 pm, Dec 10.
7.411 mi. 16-ft. class B gravel road in Lansing twp., Bingham co. and Bath twp. Clinton co.—F. F. Rogers, state hwy. com.

Minn., Lansing. 1.30 pm, Dec. 10.
Subgrade constr. as follows: State job no. 1903, Div. 1 and 2-132 acres. clearing, 127 acres grubbing, 255,867 cu. yd. excav., 599,507 cu. yd. overhaul, 53,739 cu. yd. ditching, 25 mi. in length; 9.3 mi. state job no. 1903, Div. 1 and 2- 132 acres. clearing, 127,216 cu. yd. overhauling and 13,587 cu. yd. ditching; clearing and grubbing road, all in St. Louis co.—W. H. Borgen, co. aud.

Miss. Jackson. noon, Dec. 10.
4.5 mi. fed. aid proj. no. 81 in Bolivar co., involving 23,600 sq. yd. concr. pavement, 60,000 cu. yd. grading, 4,080 cu. yd. gravel in place, 5,700 lbs. steel, etc.—X. A. Kramer, state hwy. engr.

Miss., Jackson. 2 pm, Dec. 16.
3.6 mi. fed. aid proj. no. 80 in Adams co., involving 4.3 acres clearing and grubbing, 30,000 cu. yd. excav., 5,700 cu. yd. gravel, etc.—X. A. Kramer, state hwy. engr.

Miss., Jackson. 2 pm, Dec. 17.
17.9 mi. fed. aid proj. no. 41 in Wilkinson co., involving 47 acres clearing and grubbing, 108,000 cu. yd. excav., 12,000 cu.

yd. borrow, 270 cu. yd. concr., 1,000 lin. ft. culvert pipe, 105,000 ft. lumber in bridges, 3,900 ft. piling, 20,550 cu. yd. gravel, 13,000 lbs. reinforcing steel—X. A. Kramer, state hwy. engr.

Miss., Jackson. noon, Dec. 9.
13.1 mi. fed. aid proj. no. 61 in Sharkey co., involving 1 acre clearing and grubbing, 78,132 cu. yd. embankment, 356 lin. ft. 18-in. and 114 lin. ft. 24-in. corrugated metal pipe, 12,946 lbs. reinforcing steel, 107,293 sq. yd. concr. paving, etc.—X. A. Kramer, state hwy. engr.

Miss., Marks. Dec. 1.
15 mi. concr. roads in Quitman co.—W. A. Cole, co. clk.

Mo., New Madrid. 2 pm, Dec. 1.
Grading, ditching, rock surfacing, laying vitr. and corrugated pipe on 7.5 mi. Canalou-Matthews road; grading, ditching, grubbing, rock surfacing and laying culvert pipe on Lilbourn-Parma road, in 2 sections of 7.71 and 5.57 mi. each, all in New Madrid co.—C. V. Hansen, hwy. engr.

N. J., Linden. 8 pm, Dec. 1.
Repairing with crushed stone and bitumen on city streets—J. L. Bauer, twp. engr., 120 Broad st., Elizabeth.

N. Y., Albany. 1 pm, Dec. 9.
Completing road in Oswego co., involving 6.36 mi. bituminous macadam—F. S. Greene, state hwy. comr.

N. Dak., Jamestown. 8 pm, Dec. 1.
Paving various streets and alleys with concr., vitr. repressed brick, creosote wood blk., bitulithic, bituminous concr., or sheet asphalt, on concr. base, involving 14,040 cu. yd. earth exav., 3,162 lin. ft. concr. curb, 5,307 sq. yds. concr. alley pavement, 1,669,500 lb. reinforcing steel, 53,607 sq. yd. pavement, etc.—C. E. McElroy, city aud.

O., Hillsboro. Dec. 1.
Grading and macadamizing road—J. S. Kerns, co. aud.

O., Dayton. 10 am, Nov. 28.
Paving Dayton-Springfield road with brick and Dayton-Indianapolis with brick—Montgomery co. surveyor.

O., Hamilton. noon, Nov. 25.
Improving 3 streets by paving, curbing and guttering, sanitary sewers, hose connections and water service connections—J. J. Sloat, dir. pub. serv.

O., Euclid. Dec. 6.
Improving road in vil.—W. A. Stinchcomb, Cleveland.

O., Youngstown. Dec. 3.
Paving several streets—C. F. Ohl, clk., bd. pub. serv.

O., Euclid. Dec. 8.
Improving 1 mi. road—F. A. Pease Engrg. Co., Marshall bldg., Cleveland.

Tex., Tyler. 2 pm, Dec. 1.
Grading draining and surfacing 7.82 mi. state hwy., fed. aid proj. no. 115, involving 41,443 cu. yd. earth excav., 37,290 sq. yd. cement concr. pavement, 11,717 gravel-clay surfacing from local pits, 388 cu. yd. class A concr. in bridges and culverts—D. K. Caldwell co. hwy. engr.

Utah, Salt Lake City. 10 am, Dec. 2.
Grading, curbing, guttering and constructing private driveway paving—W. W. Leatham, city recorder.

Ont., Toronto. noon, Nov. 25.
Asphalt pavements, concr. curbings and concr. sidewalks on several streets—Dept. works, city hall.

SEWERAGE.

Fla., Fort Myers. 2.30 pm, Dec. 2.
See "Streets and Roads."

Ind., Beach Grove. 7 pm, Dec. 5.
Laying sewer—V. Pierson, to clk.

Minn., Milaca. 7 pm, Dec. 5.
Sewers in dist. no. 1, involving 2,200 lin. ft. 18-in., 752 lin. ft. 15-in. sewer and concr. manhole; 1,191 lin. ft. 6-in. and 381 lin. ft. 4-in. cast iron water main; also sewers in dist. no. 2, involving 1,100 lin. ft. 18-in. sewer and 724 ft. 6-in. cast iron water main and 2 manholes—J. D. Gray, engr.

La., New Orleans. noon, Dec. 15.
Sewerage and water works—F. S. Shields, secy., Sewerags and Water Board.

Minn., Hanley Falls. 3 pm, Dec. 5.
Complete sanitary sewer system, involving furnishing and installing 1,384 ft. 10-in., 1,195 ft. 8-in. and 2,860 ft. 6-in. S. S. pipe, 24 ft. 18-in. corrugated iron culvert pipe, 6 manholes, 13 lampholes, and 86 "ls."—E. W. Youngdale, engr., Granite Falls.

N. J., Trenton. 2 pm, Nov. 28.
Drain in city street and sewer in another street—L. D. Hirsch, city clk.

N. Y., New York. 11 am, Nov. 26.
Sewer in city street—E. Riegelmann, pres., boro of Brooklyn.

O., Youngstown. noon, Nov. 28.
Building and reinforcing concr. trestles and bridges, carrying sewer across ravines in Mill Creek dist.—C. F. Ohl, dir. pub. serv.

O., New Lexington. Nov. 29.
Sewage disposal plant for children's home—co. aud. Chute.

Vt. Burlington. noon, Dec. 22.
Tile underdrain in city street—T. W. Dix, engr.

Ont., Sandwich. Nov. 27.
Completing south sewage interceptor in Sandwich and Ojibway, involving laying 16-ft. 42-in., 4,360 fft. 39-in. and 4,320 ft. 39-in. and 4,320 fft. 27-in. rein. concr. lock-joint pipe in 4-ft. lengths; building 5 concr. and brick manholes and setting cast-iron frames and covers; pumping and clearing out 4,000 ft. existing sewer and shaping ditches; replacing 80 sq. yd. concr. street pavement—M. Knowles, Ltd, 66 Ouellette ave.

WATER SUPPLY.

Fla., Fort Myers. 2.30 pm, Dec. 2.
See "Streets and Roads."

Ill., Jacksonville. Jan. 1.
Filtration plant—E. M. Henderson, engr.

Ia., Iowa Falls. noon, Dec. 1.
Drilling well at city water works, 10 or 12-in. well and casing—J. O. Greegg, city clk.

Neb., Randolph. 8 pm. Nov. 30.
Extending water mains (4-in.)—Ray Kirk, clk.

O., Euclid. Dec. 8.
Constructing 6-in. water main in two streets and 8-in. water main in one street—F. A. Pease Engr. Co., Marshall bldg., Cleveland.

Pa. Erie. 1.30 pm, Dec. 12.
Rein. concr. covered reservoir—Chester & Fleming, engrs., Union Bank bldg. Pittsburgh.

Wash., Bellingham Nov. 28.
81 tons 8-in and 55 tons 12-in cast iron water pipe bell and spigot joints class C—C. A. McLennon, city contr.

LIGHTING AND POWER.

O., Elyria. Dec. 1.
Furnishing and installing steam pumping equipment with condensers and auxiliaries—M. Knowles, Jones bldg., Pittsburgh, Pa.

Can., Winnipeg. 3 pm, Dec. 1.
Supplying and installing six 1,000 K. V. A. step-down, single-phase transformers for city light and power dep.—C. J. Brown, city clk.

P. R. Point Borinquen. Dec. 17.
Light station here—Comr. light houses, Washington, D.C.

FIRE EQUIPMENT.

N. J., Tenafly. 8 pm, Dec. 3.
Motor driven fire apparatus with necessary appliances—H. J. B. Willis, boro clk., P. O. Box 3.

O., Columbus. noon, Dec. 1.
3,000 ft. cotton, multiple woven or double jacket, rubber lined 2½ in fire hose with standard 2½ in. couplings, in 50-ft. sections—G. A. Borden pres, bd. purch.

BRIDGES.

Ga., Howard. 10 am, Dec. 3.
160-ft. bridge over Patsiliagi creek, with concr. abutments, etc.—H. P. Wallace, clk., Taylor co. comrs., Butler.

Kan., Wellington. 2 pm, Dec. 3.
Fed. aid bridge work in Summer co. consisting of one rein concr. through girder bridge, two 5-ft. spans. 18-ft. roadway, involving 443.72 cu. yd. concr. 49,835 lbs. rein. steel, etc.—J. W. Mavity, co. engr.

Kan., Abilene. 2 pm, Dec. 1.
Bridge work in Dickinson co., including one 20-span rein. concr. thru girder bridge, involving 159.9 cu. yd. concr. and 4,818 lbs. steel; three 24-span thru girder bridges, 28-ft. roadway and one 40-span tee girder bridge with 20-ft. roadway.—H. W. King, co. clk.

Minn. Bemidji. 2 pm, Dec. 5.
Furnishing and installing 30 culverts of corrugated metal on judicial ditch no. 36 and 30 metal culverts on judicial ditch no. 30, average haul 40 mi.—A. D. Johnson, co. aud.

Minn., Duluth. 1 pm, Dec. 4.
9 bridges in St. Louis co., concr. slab, steel span, concr. girder, etc; also furnishing portable concr. culverts—W. H. Borgen, co. aud.

Neb., Meadville. 9.30 am, Dec. 16.
Bridge across Niobrara river consisting of 2 standard 15-ton steel trusses. 160-ft. span, 16-ft. roadway, concr. floor on 2 concr. abutmente and one concr. pier supported by steel piles—R. M. Harris, co. clk.

N. C., Greenville. noon, Dec. 1.
Reconstructing bridge over Tar river—J. B. Harding, hwy. engr.

Wash., Wenatchee. 2pm, Dec. 8.
Concr. bridge over Wenatchee river Cashemer, Chelan co., consisting of 5 concr. arches, with concr. retaining wells, total length 500 ft. involving 1,820 cu. yd. concrete, 2,000 cu. yd. earth fill and 80,600 lbs. steel reinforcement—Co. engr.

Wis., Milwaukee. 10.30 am, Dec. 10.
North Ave. viaduct and side approach over the C. M. & St. P. Ry. tracks and Milwaukee river, including concr. viaduct consisting of 183 ft. retaining wall with earth fill: 142 ft. concr. beam-and slab constr.; 141 ft. steel girders, concr. encased, over C. M. & St. P. Ry. tracks; 348 ft. concr. beam-and-slab constr.; and 571 ft. concr. arch, 3 arch spans, over Milwaukee river; total width 61 ft. 6 in. with 40 ft. clear roadway; side approach 600 ft. long and 28 ft. wide, and a stariway—Supt. bridges and pub. bldgs.

Cuba, Santo Domingo. Jan. 15.
Rein .concr. bridge and aproaches over Rio Yaque del Norte on road from Monte Cristi to Dajabon, in province of Monte Cristi, Dominican Republic, to consist of 2 rein. concr. cantilever arches of 100 ft. span each, 2 cantilever concr. approach spans of 42 ft. each and 2 approach fills each 200 ft. long, over all length, 314 ft. and out width 18 ft. 9 in.—A. J. Collett, dir. gen. pub. wks., Dominican Republic

MISCELLANEOUS.

Fla., Jacksonville. 2.30 pm, Nov. 31.
Furnishing 8,000 in. no. 8 triple-braided weatherproof copper wire—R. N. Ellis, purch. agt., city hall.

La., New Orleans. 11 am, Dec. 1.
Furnishing and placing 25,000 tons stone and 5,000 cords willow brush along jetty at South Pass—U. S. Engr. Office, Customhouse.

Minn., International Falls. 2 pm, Dec. 3.
Culverts on judicial ditch no. 36 in Beltrami co.—A. D. Johnson, co. aud.

Miss., Lake Cormorant. Dec. 2.
67 mi. open drainage canals in Tunica and De Sota cos., 12 to 70-ft. bottom widths, involving 3,340,000 cu. yd. floating dredgework—Morgan Engrg. Co., Goodwyn Institute bldg., Hemphis, Tenn.

Miss., Shaw. Dec. 3.
Cutting 13½ mi. canal, 500,000 cu yd. excav., 200 acres clearing—J. M. Harbert Engrg. Co., Indianola.

Mo., Trenton. 4 pm, Dec. 1.
95,500 cu. yd. earth excav. in drainage dist., Wilson twp.—M. H. Mooney, engr.

N. Y., New York. noon, Dec. 3.
Dredging and removing rocks in East river—U. S. Engrg. Office, 39 Whitehall st.

N. Y., Buffalo. 11 am, Dec. 2.
Constructing locks on Buffalo river and southerly ramp of Hamburg turn-pike on approach to bridges and viaducts over Ship canal and Buffalo creek railroad tracks; also concr. dock on channel side of Bird Island pier—A. W. Kreinheder, comr. pub. wks.

O., Toledo. noon, Dec. 9.
Contr. no. 1 of Ten Mile Creek intercepting sewer, consisting of a 72-in. circular sewer, 17,080 ft. long and one 1,400 ft. long, manholes and appurtenances—D. H. Goodwillie, dir. pub. serv.

Pa., Pittsburgh. 11 am, Dec. 2.
Public hwy. tunnel and approaches, 6,289 ft. long, consisting of 2 separate parallel tubes 59 ft. between centers, each 26 ft. wide—A. D. Neeld, consltg. engr., 508 Bakewell bldg., Grant and Diamond sts.